367

CONTENTS

SAMS PHOTOFACT* SET No. 367

*TRADEMARK

PROPERTY OF
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3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	MODEL	SET AND FOLDER NO.
Admiral	TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D) Tel. Rec.	367-2
Airline	WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C Tel. Rec.	367-3
Andrea	CRP-24W	367-4
Bell Sound	RT-204 Recorder	367-5
Firestone	13-G-208, 13-G-209 (Code 199-6-A2010) Tel. Rec.	367-6
Monitoradio	MRC-10	367-7
Motorola	7MX	367-8
Motorola	26F1, 26F2 (Ch. HS-491)	367-9
Newcomb	CO-1012	367-10
Packard-Bell	21CD1, -U, 21CD2, -U, 21DD1, -U, 21DT1, -U, 24DC1, -U, 24DD1, U, 24DT1, U (Ch. 98D1, U) Tel. Rec. Prod. Chg. Bul. 189	367-1
RCA Victor	14S7062, U, 14S7063, U, 14S7069, U, 14S7070G, 14S7071G, 14S7072G, GU, 14S7073G, GU, 14S7074G, 14S7079G, GU (Ch. KCS102B, D, F) Tel. Rec. Prod. Chg. Bul. 189	367-1
Sentinel	Chassis U72-01AA, U72-02AA, V72-01AA, V72-02AA (72 Series) Tel. Rec.	367-11
Silvertone	7204, 7206 (Ch. 132.41800) Prod. Chg. Bul. 189	367-1
Zenith	Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16Z25, U) Tel. Rec.	367-12

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 16 IN SET 354

RCA VICTOR MODELS 14S7062, U, 14S7063, U, 14S7069, U, 14S7070G, 14S7071G, 14S7072G, GU, 14S7073G, GU, 14S7074G, 14S7079G, GU (Ch. KCS102B, D, F)

	RCA Victor Models 14S7052, U, 14S7070, U, 14S7071, U and 14S7074, U (Ch. KCS102B, D) were covered in Photofact Folder 16 - Set 354. Models 14S7062, U, 14S7063, U, 14S7069, U, 14S7070G, 14S7071G, 14S7072G, GU, 14S7073G, GU, 14S7074G and 14S7079G, GU (Ch. KCS102B, D, F) are added along with production changes, with the publication of this bulletin.
Ch. KCS102B, D "Early Production"	COMPONENT CHANGES C23 is 470MMF, part #78622. C58 is .01MFD, part #73561. C74 is omitted. R20 is 18Ω, part #502018. A 22K, ½ watt resistor is added from pin 7 of V4A (2nd. Video IF) to ground.
Ch. KCS102B, D "Late Production"	COMPONENT CHANGES The wattage rating of R30 is increased from ½ watt to 1 watt. The wattage rating of R32 is increased from 1 watt to 2 watts. R63 is decreased from 1.5Meg to 1.2Meg. R85 is decreased from 27Ω to 22Ω. R84 is decreased from 18K to 15K.
Ch. KCS102F	NEW VHF TUNER Models 14S7070G, 14S7071G, 14S7074G (Ch. KCS102F) use a new VHF tuner, part #KRK22R. A schematic of the tuner is given on the reverse side. The tuner has been properly aligned at the factory and is very stable. Alignment of this tuner should not be required in the field.

PRODUCTION CHANGES
BULLETIN 189

PRODUCTION CHANGES
BULLETIN 189

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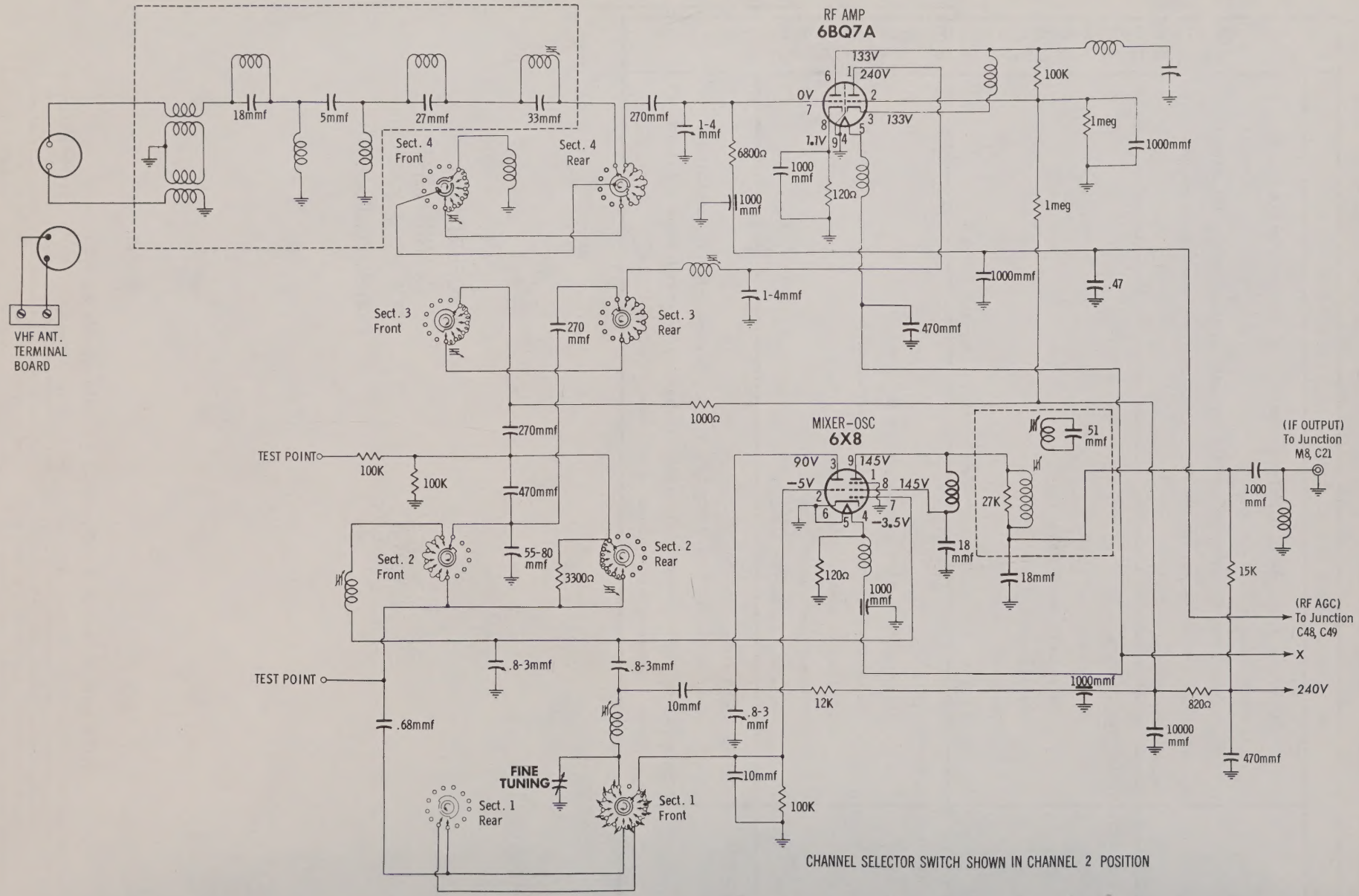

RF AMP
6BQ7A
133V
240V
0V
133V
1.1V
100K
1meg
1000mmf
1meg
1000mmf
.47
470mmf
1-4mmf
270mmf
1-4 mmf
6800Ω
1000 mmf
120Ω
1000 mmf
18mmf
5mmf
27mmf
33mmf
Sect. 4 Front
Sect. 4 Rear
VHF ANT. TERMINAL BOARD
Sect. 3 Front
Sect. 3 Rear
270 mmf
1000Ω
270mmf
MIXER-OSC
6X8
90V
145V
-5V
145V
-3.5V
51 mmf
27K
18 mmf
18mmf
120Ω
1000 mmf
TEST POINT
100K
100K
470mmf
Sect. 2 Front
Sect. 2 Rear
55-80 mmf
3300Ω
(IF OUTPUT) To Junction M8, C21
1000 mmf
15K
(RF AGC) To Junction C48, C49
X
240V
TEST POINT
.8-3mmf
.8-3mmf
10mmf
12K
1000mmf
820Ω
.68mmf
.8-3 mmf
10000 mmf
470mmf
FINE TUNING
Sect. 1 Rear
Sect. 1 Front
10mmf
100K
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 2 POSITION

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 9 IN SET 318

PACKARD-BELL MODELS 21DC1, -U, 21DC2, -U, 21DD1, -U, 21DT1, -U, 24DC1, -U, 24DD1, -U, 24DT1, -U (Ch. 98D1, -U)

Packard-Bell models 21DC1, 21DC1-U, 21DC2, 21DC2-U, 21DD1, 21DD1-U, 21DT1, 21DT1-U, 24DC1, 24DC1-U, 24DD1, 24DD1-U, 24DT1 and 24DT1-U (Ch. 98D1) were covered in Photofact Folder 9 - Set 318.

The following changes were made during late production. These changes cover all models.

VIDEO IF TUBES CHANGED

V3, 1st. video IF, and V4, 2nd. video IF, are changed from 6CB6 to 6DE6.

COMPONENT CHANGES

A .047 MFD @ 400V capacitor is added from the junction of R16 and tuner terminal E to ground.

A .01MFD capacitor and a 100K, ½ watt resistor (wired in series) are added from the junction of R24 and R40 to the junction of R91 and C2.

A 100K, ½ watt resistor is added from pin 7 of V7A to the 265 volt source.

A 100K, ½ watt resistor is added from pin 8 of V7A to the 265 volt source.

C72 is decreased from 91MMF to 68MMF.

C73 is decreased from 120MMF to 68MMF.

A 1000Ω, ½ watt resistor is added from pin 2 of V13 to ground.

R82 is decreased from 1Meg to 470K.

R86 is decreased from 2700Ω to 2200Ω.

A 15K, ½ watt resistor is added from terminal 3 of T2 to C47.

The voltage rating of C47 is increased from 1KV to 4KV.

A .0047MFD @ 600V capacitor is added from C76 to the junction of R80 and C73.

The wattage rating of R91 is increased from 4 watts to 10 watts.

SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 16 IN SET 346

SILVERTONE MODELS 7204, 7206 (Ch. 132.41800)

Silvertone Models 7200 and 7202 (Ch. 132.40200) were covered in Photofact Folder 16 - Set 346.

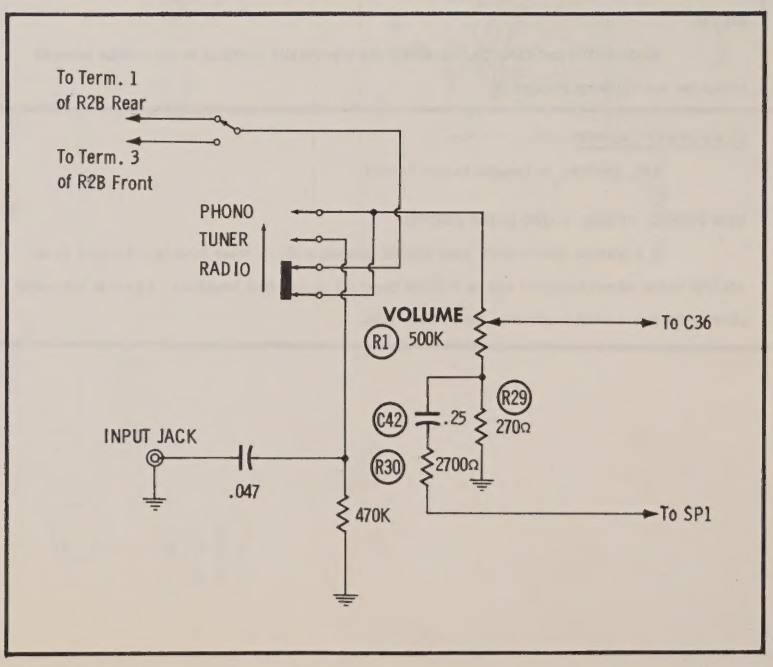
Models 7204 and 7206 (Ch.132.41800) are electrically identical to the models covered except for the following changes.

COMPONENT CHANGE

SP1, speaker, is changed to part #44289.

NEW PHONO, TUNER, RADIO SLIDE SWITCH

A 3 position slide switch (part #44292) is used enabling these models to be used as an AM/FM radio, phono amplifier and an AM/FM tuner for an external amplifier. A partial schematic showing the new circuit is given on the reverse side.


To Term. 1
of R2B Rear
To Term. 3
of R2B Front
PHONO
TUNER
RADIO
VOLUME
R1 500K
To C36
R29
C42 .25
270Ω
INPUT JACK
R30 2700Ω
.047
470K
To SP1

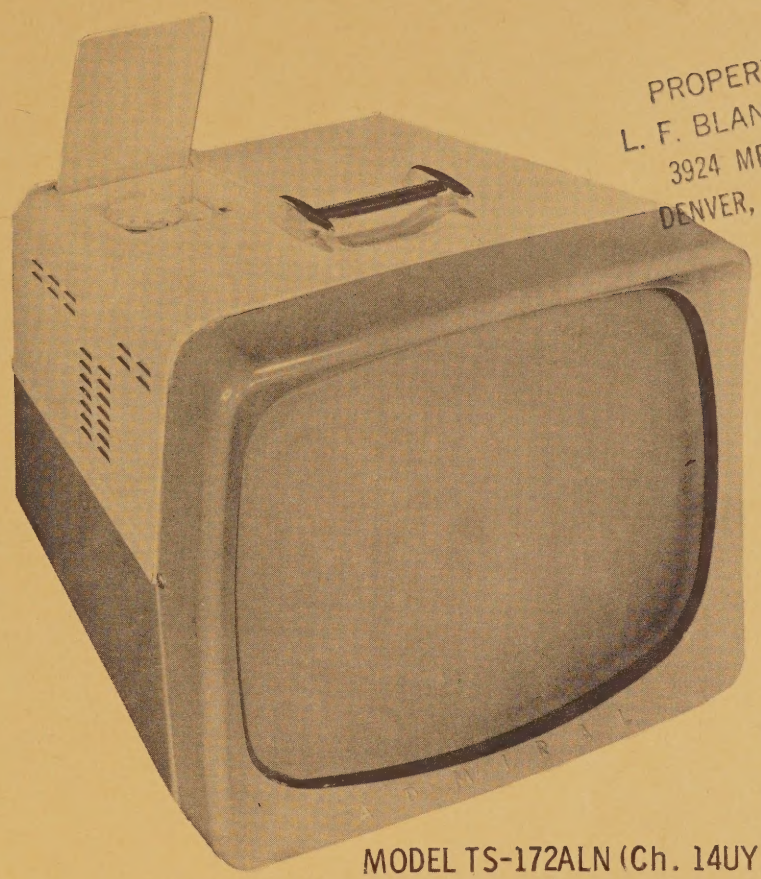
PHOTOFACT* Folder
*TRADE MARK

ADMIRAL MODELS TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D)

IMPORTANT FILING NOTICE

The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a complete volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.



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MODEL TS-172ALN (Ch. 14UY3D)

ADMIRAL MODELS TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D)

TRADE NAME	Admiral Models TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14U43D)
MANUFACTURER	Admiral Corp., 3800 W. Cortland St., Chicago 47, Ill.
TYPE SET	Television Receiver
TUBES	Fifteen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 130 Watts, 1.1 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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Chassis-Top View 9
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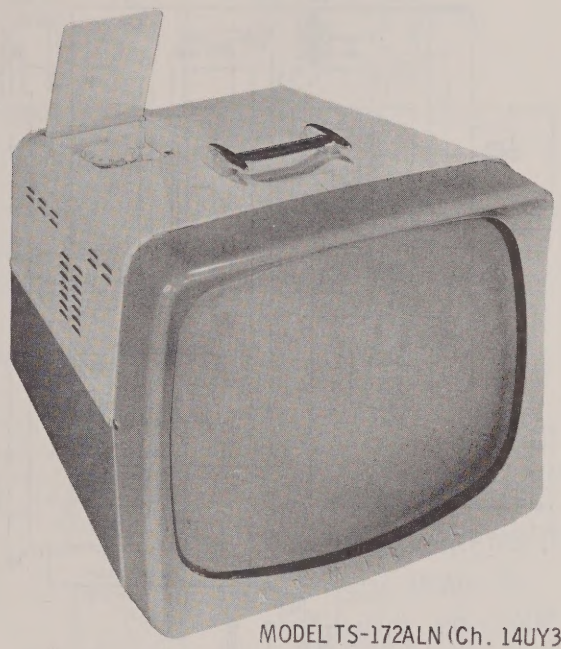
ADMIRAL MODELS TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 6 push-on type control knobs from the top.
2. Remove 2 metal screws and the control cover.
3. Remove 8 metal screws and the rear cover.
4. Remove 1 metal screw holding the rear control panel to the top bracket.
5. Remove speaker plug, picture tube socket, ion trap and yoke clamp.
6. Remove 4 chassis bolts from the bottom.
7. Partially remove the chassis, remove the HV lead, remove the chassis and yoke.
8. Remove 2 speaker nuts and the speaker.



MODEL TS-172ALN (Ch. 14UY3D)

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS

Care should be exercised when connecting test equipment or physically contacting the chassis.

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SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing 6 push-on type control knobs, 2 metal screws and the control cover. Set the fine tuning at the center of its range. The adjustments (located in a circle around the shaft) should be made in sequence from the highest to the lowest channel in the area. Channel 13 adjustment is located at 6 o'clock, proceed in a counter clockwise direction adjusting for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 metal screws from the bottom of the front and 1 from each side. Swing the bottom of the front out and up to remove.

FOCUS

The focus may be varied by the position of a strap on the base of the picture tube. The strap can be connected between pins 6 and 2 or 6 and 10. Readjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally. (For location, see tube placement chart).

FUSES

A 10Ω fusible resistor (R91) is used for LV power supply protection. (For locatin, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

ADMIRAL MODELS TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D)

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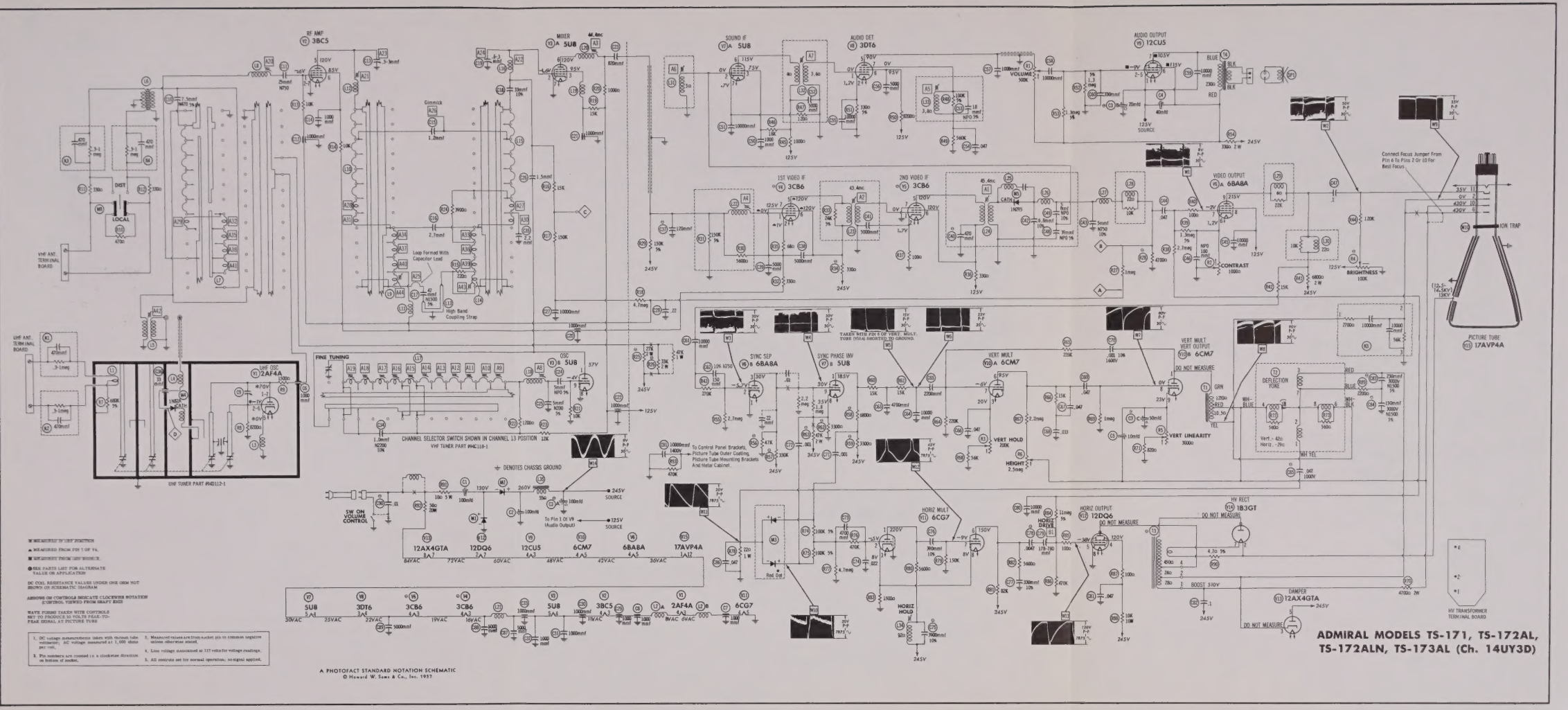
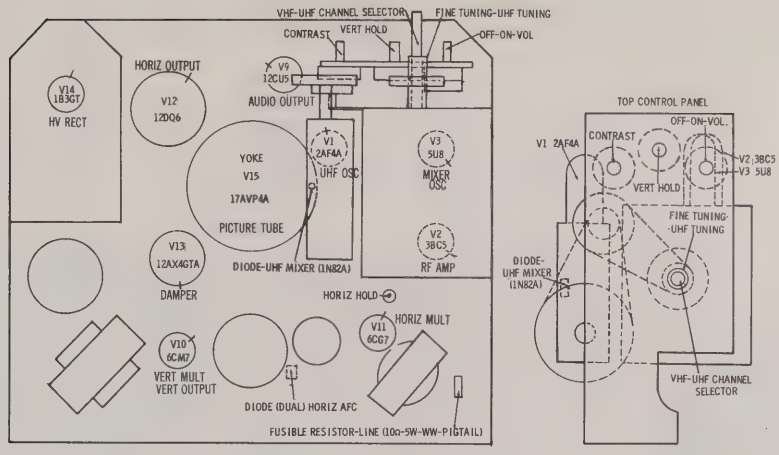
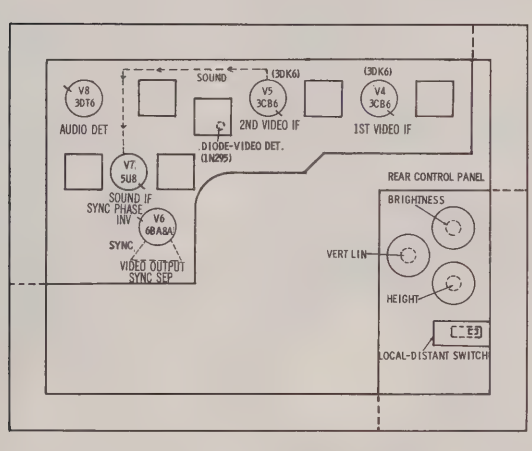

ADMIRAL MODELS TS-171, TS-172AL, TS-172ALN, TS-173AL (Ch. 14UY3D)
A PHOTOFACT STANDARD NOTATION SCHEMATIC
© Howard W. Sams & Co., Inc. 1957
RF AMP V2 3BC5
MIXER V3A 5U8
SOUND IF V7A 5U8
AUDIO DET V8 3DT6
AUDIO OUTPUT V9 12CU5
1ST VIDEO IF V4 3CB6
2ND VIDEO IF V5 3CB6
VIDEO OUTPUT V6A 6BA8A
SYNC SEP V6B 6BA8A
SYNC PHASE INV V7B 5U8
VERT MULT V10A 6CM7
VERT MULT VERT OUTPUT V10B 6CM7
OSC V3B 5U8
UHF OSC V1 2AF4A
HORIZ MULT V11 6CG7
HORIZ OUTPUT V12 12DQ6
HV RECT V14 1B3GT
DAMPER V13 12AX4GTA
PICTURE TUBE V15 17AVP4A
ION TRAP
CONTRAST 100Ω
BRIGHTNESS 150K
VOLUME 500K
VERT HOLD 200K
HEIGHT 2.5meg
VERT LINEARITY 3000Ω
HORIZ HOLD 500K
HORIZ DRIVE 100Ω
FINE TUNING
LOCAL
DIST
Gimmick
Loop Formed With Capacitor Lead
High Band Coupling Strap
VHF ANT. TERMINAL BOARD
UHF ANT. TERMINAL BOARD
UHF TUNER PART #40112-1
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF TUNER PART #40118-1
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
245V SOURCE
125V SOURCE
To Pin 1 Of V9 (Audio Output)
To Control Panel Brackets, Picture Tube Outer Coating, Picture Tube Mounting Brackets And Metal Cabinet.
TAKEN WITH PIN 6 OF VERT. MULT. TUBE (V10A) SHORTED TO GROUND.
DO NOT MEASURE
Connect Focus Jumper From Pin 6 To Pins 2 Or 10 For Best Focus
HV TRANSFORMER TERMINAL BOARD
DEFLECTION YOKE
Vert.- 42n
Horiz.- 29n
BOOST 510V
DAMPER
12AX4GTA
12DQ6
12CU5
6CM7
6BA8A
17AVP4A
5U8
3DT6
3CB6
3BC5
2AF4A
6CG7
84VAC
72VAC
60VAC
48VAC
42VAC
36VAC
30VAC
25VAC
22VAC
19VAC
16VAC
11VAC
8VAC
6VAC
1. DC voltage measurements taken with electronic tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
W MEASURED IN THIS POSITION
▲ MEASURED FROM PIN 1 OF V4.
■ MEASURED FROM HV RECT.
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

TUBE PLACEMENT CHART



TOP VIEW



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

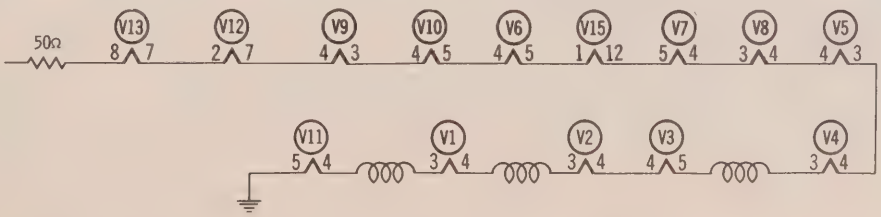
POWER SUPPLY FAILURE
No raster, no sound - Fusible Resistor (R91), Rectifiers (M1, M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V4, V5, Diode (M5), V9
No pic, no sound, has snow - V2, V3, V9 (V1, UHF only)
No pic, has sound, has raster - V6, V15, V9
Has pic, no sound - V7, V8, V9

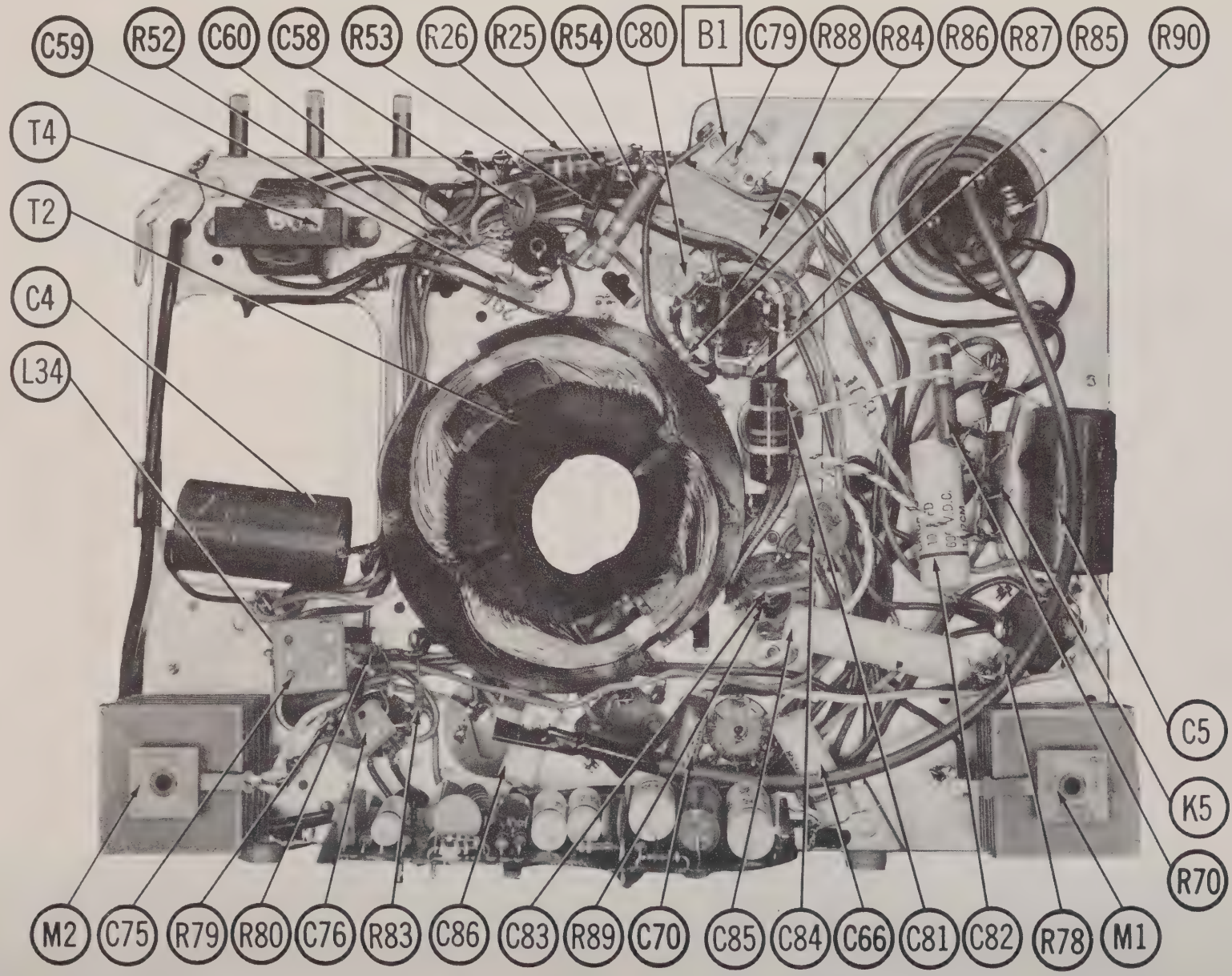
SYNC FAILURE
No vert. sync - V6, V7
No horiz. sync - V6, V7, Diode (M3)
No vert. or horiz. sync - V6, V7

SWEEP FAILURE
No raster, has sound - M3, V11, V12, V13, V14, V15
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V11, V12, V13
Narrow picture - V11, V12, V13, M1, M2
Vert. off freq. - V10
Horiz. off freq. - V11

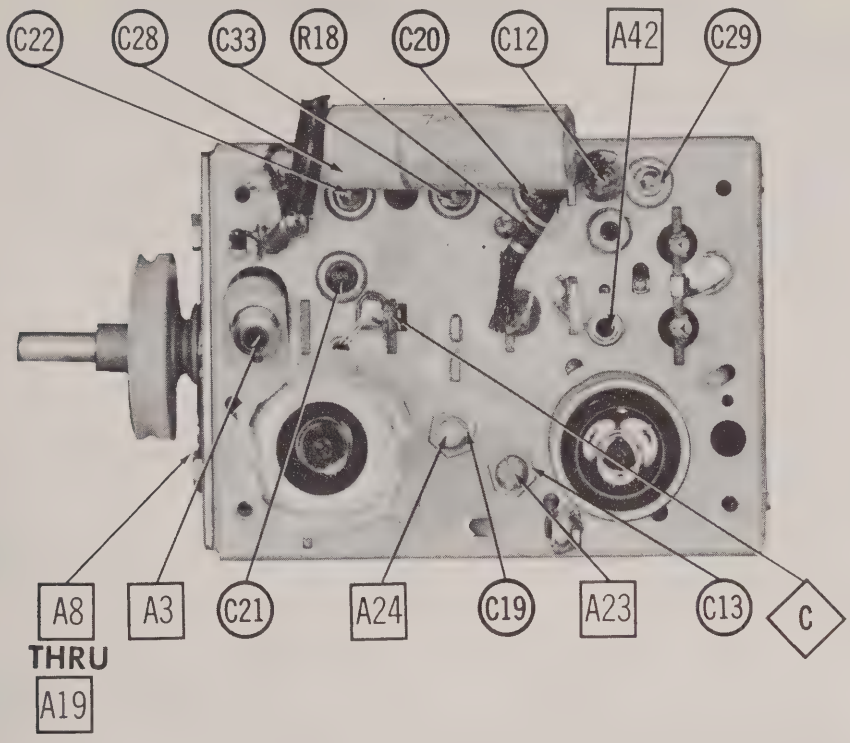
This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below.)



SET 367 FOLDER 2



CHASSIS-BOTTOM VIEW



RF TUNER-TOP VIEW

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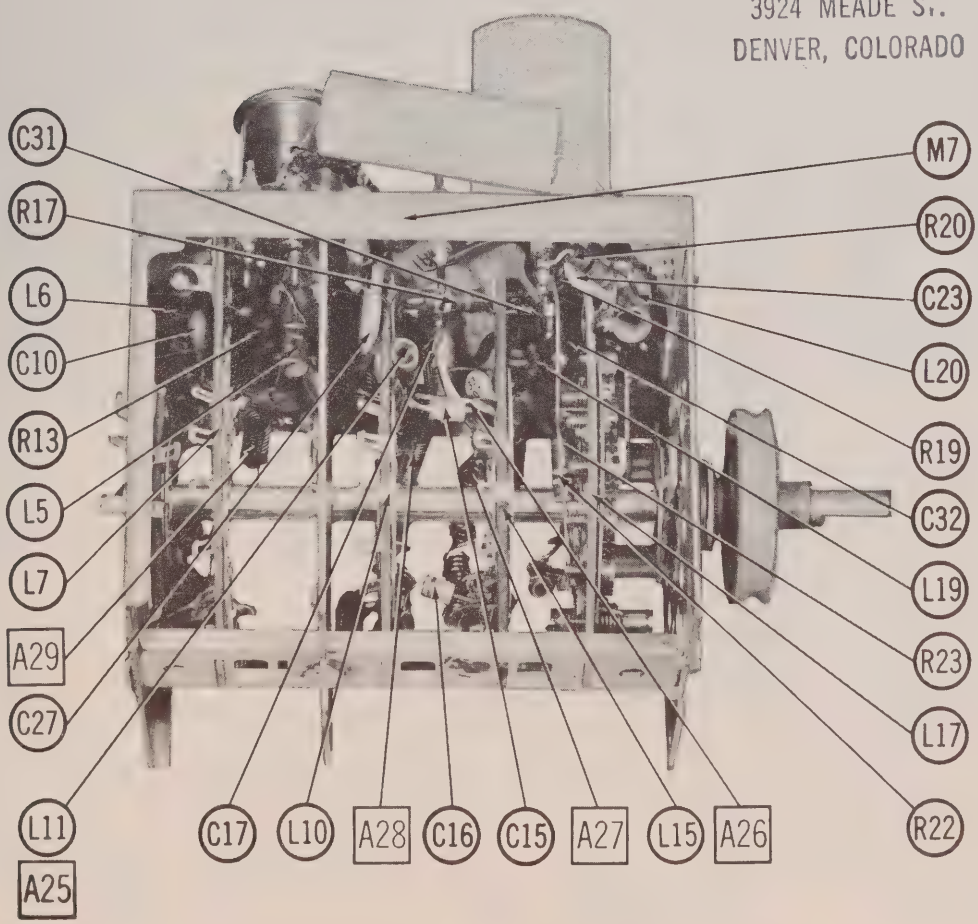


RF TUNER-LEFT SIDE

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
Allow a 20 minute warm-up period for the receiver and test equipment.

VIDEO IF ALIGNMENT

Connect the negative lead of a 2.5 volts bias supply to point Ⓐ. Positive to chassis.
Disconnect the antenna and connect a jumper across the antenna terminals. Turn the contrast control fully counter clockwise.
Use the lowest scale on the VTVM.
Use only enough generator output to provide a usable indication on VTVM.
Preset A4 by turning slug counter clockwise until the slug is approximately in the center of the coil form.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to ungrounded tube shield floating over mixer-oscillator tube (V3). Low side to chassis.	45.4MC (Unmod)	Any non-interfering channel	DC probe thru decoupling filter (Fig. 1) to point Ⓑ. Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	43.4MC	"	"	A2	"
3.	"	"	44.4MC	"	"	A3	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
If an external marker generator is used, loosely couple to the high side of the sweep generator lead.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	Direct	High side to ungrounded tube shield floating over mixer-oscillator tube (V3). Low side to chassis.	43MC (10MC Swp)	44.4MC	Any non-interfering channel	Vert. Amp. thru decoupling network (Fig. 1) to point Ⓑ. Low side to chassis.		Check for response curve similar to Fig. 2 with marker as shown. If necessary, SLIGHTLY retouch A1 thru A3 for desired response.
5.	"	"	"	43.5MC 45.75MC 47.25MC	"	"	A4	Turn A4 clockwise to reduce peak and broaden bandwidth to obtain response similar to Fig. 3. If necessary, make SLIGHT readjustment of A3 alternately with A4.

SOUND IF ALIGNMENT

Tune in the strongest TV station available and set the "Local-Distant" switch to the distant position.
Very slowly turn A5 several turns clockwise until a buzz is heard in the sound.
Then turn it counter clockwise until the loudest and clearest sound is obtained. (There may be two positions of the slug at which the sound is loud, the slug should be set at the center of the one in the most clockwise position.
Reduce the signal at the antenna terminals until there is an amount of hiss in the sound. This may best be done by placing a step attenuator between the antenna lead and the antenna terminals of the receiver. This can also be accomplished by disconnecting the antenna lead and placing in the vicinity of the antenna terminals.
Carefully adjust A6 for the loudest and clearest sound and MINIMUM hiss. If the hiss disappears during alignment, reduce the signal further until the hiss returns. Readjust A6.
Carefully adjust A7 for the loudest and clearest sound and MINIMUM hiss. If the hiss disappears during alignment, reduce the signal still further and readjust A7.
If sound is not satisfactory at this time, repeat the above procedure until desired results are obtained.
CAUTION: Do not readjust A5 without repeating the entire procedure.

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A8	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A9	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A10	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A11	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A12	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A13	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A14	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A15	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A16	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A17	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A18	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A19	

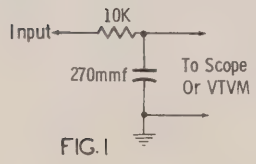


FIG. 1

FIG. 2

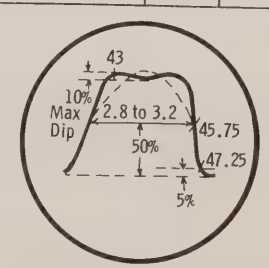


FIG. 3

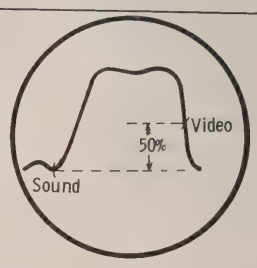


FIG. 4

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT

Set the "Local-Distant" switch to "Distant" position.
Connect the negative lead of 3 volt bias supply to point Ⓐ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
All response curves must be checked with tuner cover in place.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω Carbon Resistors	Across VHF antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A20, A21, A22	Check for response curve similar to Fig. 5 with markers as shown. A20 is adjusted for maximum amplitude. A21 and A22 are adjusted for proper bandwidth and marker position.
8.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A23, A24	Adjust for curve similar to Fig. 5.
9.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"	A25	Check for response curve similar to Fig. 5. If necessary, retouch A20 for proper shape of response. Adjust A25 (ground lead of C17) for proper bandwidth. To broaden bandwidth, move lead nearer mixer grid ground strap and vice versa.
10.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A26	Check for response similar to Fig. 5. If bandwidth is too broad, move lead (A26) closer to capacitor body (C15). If too narrow, move away from capacitor body. Use care so as not to disturb bandwidth of channels 6 thru 2.
11.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"		Check for response curve similar to Fig. 6 making sure it falls within these limits. If not, make compromise adjustments by repeating steps 7 thru 10 being careful not to disturb other channels in operation.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
12.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	*A27, A28, A29	Check for response curve similar to Fig. 5. If necessary, adjust (by compressing or expanding coil turns) coil whose "A" number is preceded by (*) for maximum amplitude. Adjust others for proper bandwidth and marker positions.
13.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	*A30, A31, A32	"
14.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	*A33, A34, A35	"
15.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	*A36, A37, A38	"
16.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	*A39, A40, A41	"

UHF IF ALIGNMENT

Connect bias as under "VHF RF And Mixer Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.
All response curve checks must be made with tuner cover in place.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	100Ω Carbon Resistors	High side to point Ⓓ. Low side to chassis. Remove 1N82A (M4).	43.5MC (10MC Swp)	41.25MC 45.75MC	UHF	Vert. Amp. thru 10K to point Ⓒ. Low side to chassis.	A42, A43, A44	Adjust A42 for maximum amplitude of response curve (Fig. 7). Adjust A43 and A44 for proper bandwidth, symmetry and marker position.
18.	"	"	"	"	"	Vert. Amp. thru decoupling network (Fig. 1) to point Ⓑ. Low side to chassis.		Increase bias to -6 volts. Check for response similar to Fig. 8. If necessary, repeat step 17 making compromise adjustment. Replace crystal (M4).

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

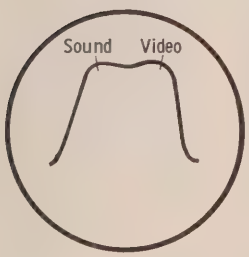


FIG. 5

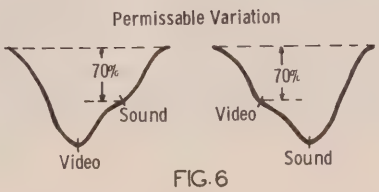


FIG. 6

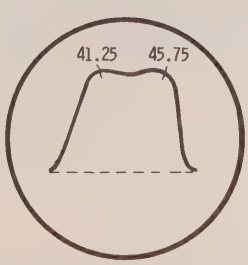


FIG. 7

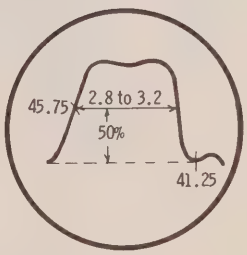
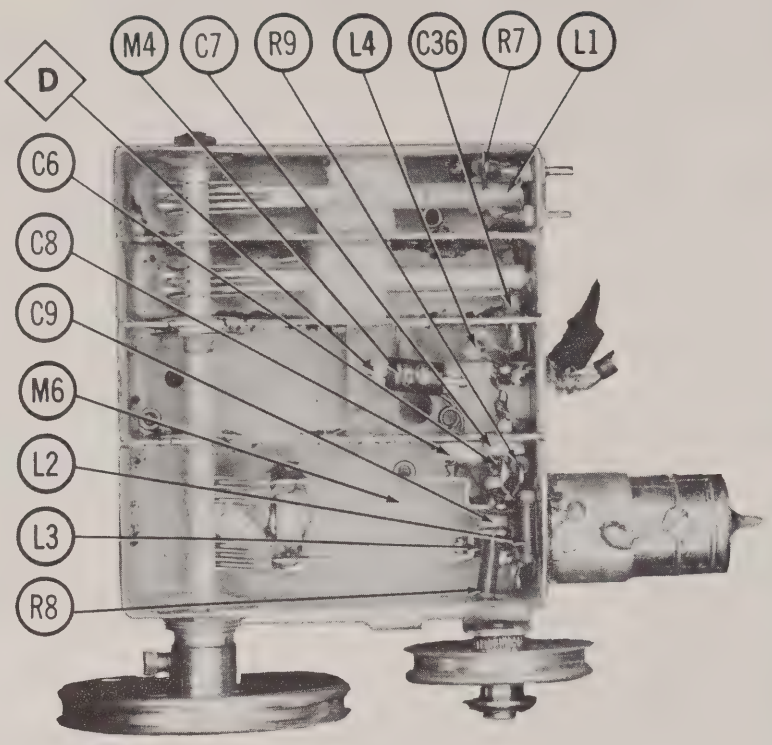
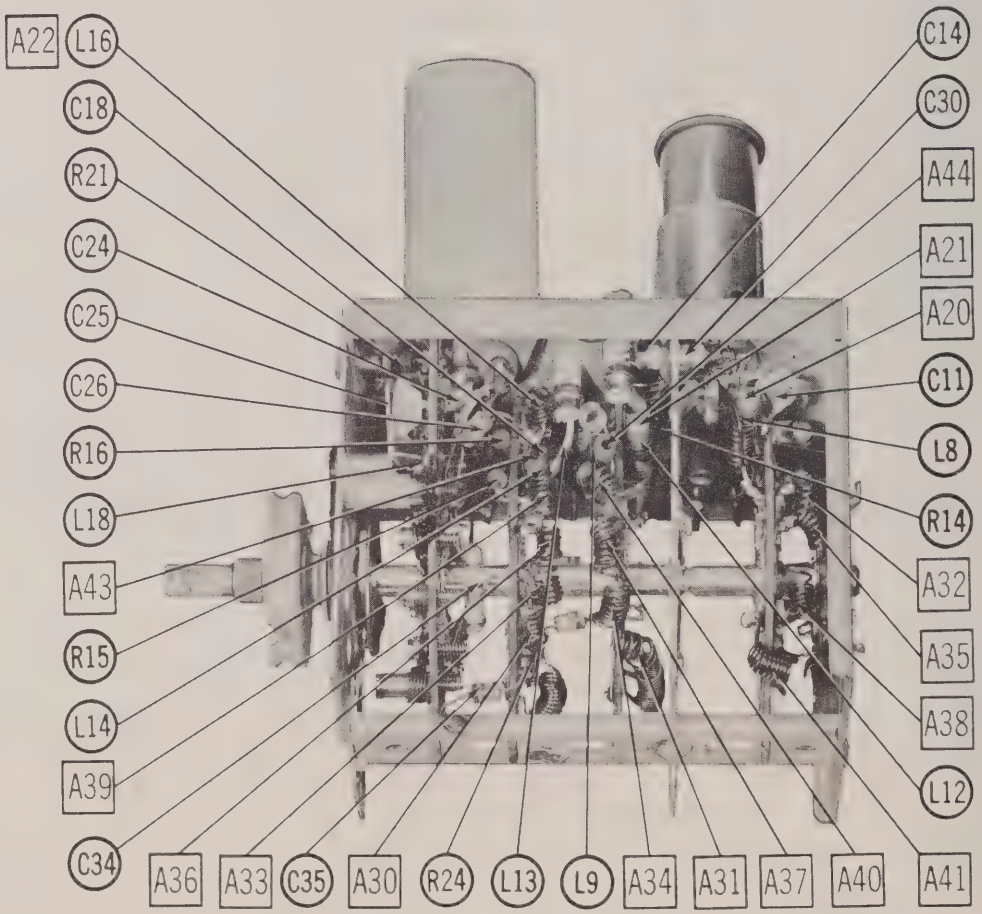


FIG. 8



UHF TUNER SIDE VIEW



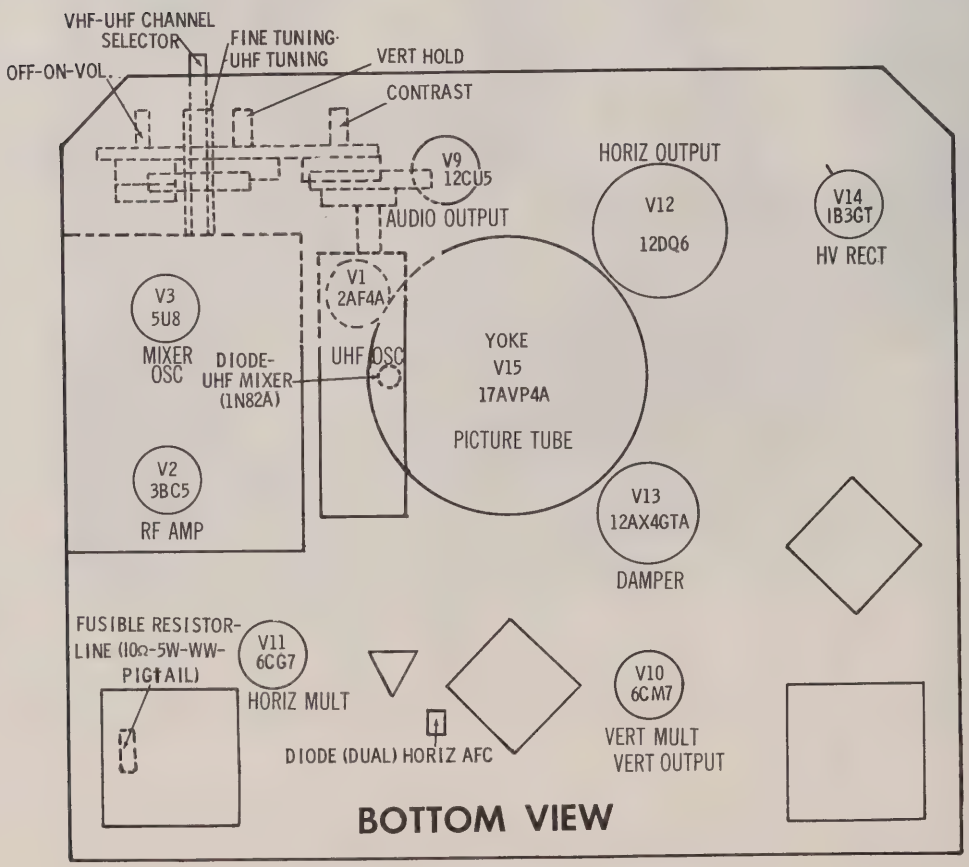
RF TUNER RIGHT SIDE

CHASSIS TOP VIEW

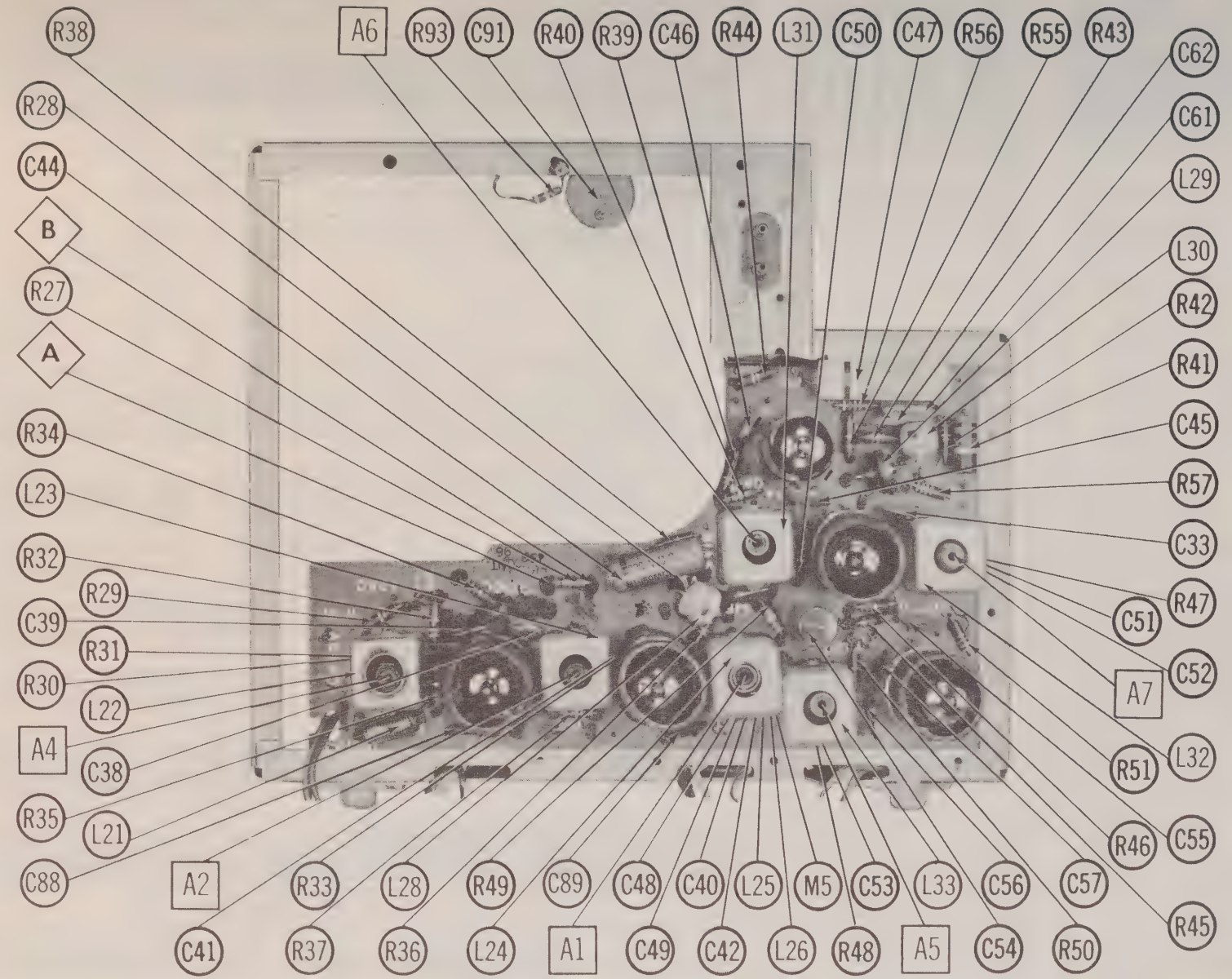
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	2AF4A	† * 16K	8200Ω	1.5Ω	2Ω	1Ω	8200Ω	† *16K		
V2	3BC5	1Meg	0Ω	2Ω	2.5Ω	▲ 330Ω	▲ 330Ω	0Ω		
V3	5U8	■ 12K	5.8Meg	■ 15K	2.5Ω	3.5Ω	■ 1000Ω	0Ω	0Ω	10K
V4	3CB6	▲ 5600Ω	▲ 68Ω	3.5Ω	4.5Ω	† 385Ω	† 385Ω	80K		
V5	3CB6	.1Ω	100Ω	4.5Ω	5.5Ω	■ 330Ω	■ 330Ω	0Ω		
V6	6BA8A	0Ω	2.7Meg	† 40K	9.5Ω	8.5Ω	● 220Ω	1.2Meg	■ 0Ω	† 6800Ω
V7	5U8	† 10K	3Ω	■ 19K	6Ω	7Ω	■ 1000Ω	120Ω	3300Ω	† 40K
V8	3DT6	3.6Ω	330Ω	6Ω	5.5Ω	† 500K	■ 8200Ω	560K		
V9	12CU5	¶	600K	11Ω	14Ω	600K	† 385Ω	† 715Ω		
V10	6CM7	‡ 5900Ω	NC	● 150K	11Ω	9.5Ω	‡ ● 3Meg	220K	1Meg	● 1500Ω
V11	6CG7	† 5700Ω	5.2Meg	1500Ω	1.5Ω	0Ω	† 82K	150K	1500Ω	0Ω
V12	12DQ6	TP	16Ω	TP	† 10K	470K	TP	14Ω	0Ω	TOP CAP ‡ 24Ω
V13	12AX4GTA	TP	TP	¶	NC	† 55Ω	TP	16Ω	18Ω	
V14	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡ 474Ω
V15	17AVP4A	8.5Ω	56K	PIN 6 ‡ 4700Ω	PIN 10 ‡ 4700Ω	PIN 11 ● 140K	PIN 12 7Ω			

† MEASURED FROM OUTPUT OF M2.
* MEASURED IN UHF POSITION.
● THIS READING WILL VARY, CONTROL SET FOR NORMAL OPERATION.
■ MEASURED FROM 125 VOLT SOURCE.
‡ MEASURED FROM PIN 3 OF V13.
▲ MEASURED FROM PIN 7 OF V4.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE St.
DENVER, COLORADO

VIDEO IF PRINTED BOARD

ADMIRAL MODELS TS-171, TS-172AL,
TS-172ALN, TS-173AL (Ch. 14UY3D)

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	UHF Oscillator	2AF4A	
V2	RF Amplifier	2DC5	
V3	Mixer-Oscillator	5L8	
V4	1st Video IF Amp	3CD6	Note 1
V5	2nd Video IF Amp	3CD6	Note 1
V6	Video Output-Sync Sep	6BA8A	
V7	Sound IF - Sync Phase Det	5L8	
V8	Audio Det	3UT6	
V9	Audio Output	1BU8	
V10	Vert Multi.-Vert. Output	6CM7	
V11	Horiz Multi.	6CG7	
V12	Horiz Output	14W8	
V13	Damper	1B4X4GTA	
V14	HV Rectifier	1B3GT	

Note 1. Some versions may use a 3DK6 in this application. Replace with type used.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	ADMIRAL PART No	GENERAL ELECTRIC PART No	SYLVANIA PART No	
V15	17AVP4A	17AVP4A 1	17AVP4A-2 ① 17AVP4A ② 17AVP4A	① Aluminized ② Silver screen 85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA							
	CAP	VOLT	ADMIRAL PART No	AEROVOX PART No	CORNELL DUBILIER PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	SPRAGUE PART No	
C1	100	150	87D18-1R	AFH1-R1	FP1J6	TM3-13	S-090	TVL-1433		
C2	100	100	87D18-9R	AFH1-3R-05	AO340	FP1J0	TM5-60	S-190	TVL-1150	
C3 A	40/80	350		AFH4-5T-90	CO330	FP2H3	TMT-70	T-116	R2437 * ①	
B	40/80	350			TC89	FP2H3	TMT-50-50	TMT-0550		
C	450	50								
C4	40	200	67A25-2	PRS2509/40	BR4025	TU58	TU-40-250	MT-2540	TVA-1510	
C5	10	500	67A4-34	PRS500V10	BR1J50	TU51	TU-10-500	MT-5010	TVA-1963	

* Non-catalog item.
① Some versions may use (C3A) 100MFD @ 350V, (C3B) 80MFD @ 350V, (C3C) 30MFD@ 50V
(Part #67D35-13B)

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA					NOTES
	CAP.	VOLT.	ADMIRAL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	MALLORY PART No.	SPRAGUE PART No.	
C6	.1000		94D12-81	EF-001	MFT-1000			503C-D1	
C7	1000		94D12-51	EF-001	MFT-1000			503C-D1	
C8	1000		94D12-51	EF-001	MFT-1000			503C-D1	
C9			94D12-81						
C10	7.5		94D77-78						N47G 5%
C11	25		94C18-51	N750-S1 25	TCN-25	C50Q25U	TCT-25		N750
C12	1000		94C18-52	EF-001	MFT-1000			503C-D1	
C13	3-3		94D77-78		529-3		31J5-D	CT69EA	
C14	1000		94C18-52		MFT-1000	BYA8DI	ED-1000	DC52I	SHK-D1
C15	1-2		94C18-56	NP0-S1 1.0	TCZ-1.0	C90V1C	TCO-1.0		NP0 5%
C16	2-7		94C18-55						
C17	47		94C18-57						N2500 5%
C18	33			NP0-S1 33	TCZ-33	L10Q33	TCO-33	ET-S53	STCC-Q33	10%
C19	3-3		94C18-54		529-3		31J5-D	CT69EA		
C20	1000		94C18-52	EF-001	MFT-1000				503C-D1	
C21	1000		94C18-61	EF-001	MFT-1000				503C-D1	
C22	1000		94C18-52	EF-001	MFT-1000				503C-D1	
C23	820			BPD-0008	DD-831	BYA10TS1	ED-830			
C24	5		94C18-63	NP0-S1 5	TCZ-5	C10V5C	TCO-5	ET-S55		NP0 .5%
C25	5		94C18-54							N330 5%
C26	1-5		94C18-59	NP0-S1 1.5	TCZ-1R5	C10V1SC	TCO-1.5	ET-S51	STCCB-V15	
C27	10000		94C18-60	EF-001	DD-1001	BYA8DI	ED-1000	DC52I	SHK-B1	
C28	22	200	67C25-55	PZ8BN-22		CU2B22		GEM-2022	ETM-Z2	
C29	1000		94C18-52	EF-001	MFT-1000				503C-D1	
C30	1000		94C18-52	EF-001	MFT-1000				503C-D1	
C31	1000		94C18-53	BPD-001	DD-102	BYA8DI	ED-1000	DC52I	BHK-D1	
C32	1000		94C18-53	BPD-001	DD-102	BYA8DI	ED-1000	DC52I	BHK-D1	
C33	1000		94C18-52	EF-001	MFT-1000				503C-D1	
C34	1.0		94C18-62							
C35	2.2		94C18-54	NP0-S1 2.2	TCZ-2R2	C10V2C	TCO-2.2		STCCB-V22	
C36	33		94D12-52							
C37	120		65D6-108	S1 1R0	D6-1R1	LT6T12	GP-1R0	UC-5312	5GA-T12	①
C38	5000		65D10-8	BPD-006	DD-502	BYA10DB	ED-005	DC52S	BHE-D6	
C39	5000		65D10-5	BPD-006	DD-502	BYA10DB	ED-005	DC52S	BHE-D6	
C40	470		65D6-120	S1 470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
C41	5000		65D10-5	BPD-005	DD-502	BYA10DB	ED-005	DC52S	BHE-D6	
C42	6 8		65B28-068	NP0-S1 6 8	TCZ-6R8	C10V6SC	TCO-6.8	ET-S556	STCCB-V68	10%
C43	5			NT50-S1 5	TCN-5	C10V5U	TCT-5	ST-S55	STCU-V5	N750 10%
C44	.047	200		BPD-05	DF-503	CU2S47		GEM-2247	ETM-D47	
C45	10000			BPD-01	DD-103	BYA8SI	ED-01	DC51I	SHK-S1	
C46	100			NP0-S1 100	TCZ-100	C10V1C	TCO-100	ET-S31	STCC-T1	NP0
C47	1	400		94C25-83	P4BN-1	DF-104	CU4P1		GEM-401	ETM-P1
C48	39			85C44-33		C90P39C	TCC-39		STCC-Q39	NPO 5%
C49	5			65D10-108	NP0-S1 5	TCZ-5	C10V5C	TCO-5	ET-S55	STCCB-V5	NPO 10%
C50	1000			65D10-6	BPD-001	DD-102	BYA8DI	ED-1000	DC52I	BHK-D1	
C51	10000			85C44-3	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1	
C52	5000			65D10-5	BPD-006	DD-502	BYA10DB	ED-005	DC52S	BHE-D6	
C53	18			85C44-37		TCZ-18	C10Q18C	TCO-18			NPO 5%
C54	.047	600		94B16-55	BPD-05	DF-503	BC86472		ACS6147	98K-947
C55	10000			85C44-3	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1
C56	5000			65D10-5	BPD-006	DD-502	BYA8DB	ED-005	DC52S	BHE-D6
C57	1000			65D10-55	BPD-001	DD-103	BYA8DI	ED-1000	DC52I	BHK-D1
C58	10000			65D10-3	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1
C59	10000			65D10-3	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1
C60	330			65D10-118	BPD-00033	DD-331	LU7T33	GP-330	UC-5333	5GA-T33
C61	10000			85C44-3	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1
C62	330			85C44-15	NP0-S1 150	TCZ-150	C10V15C	TCO-150		STCU-V15	N750 10%
C63	4700			65D10-112	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-T47	
C64	10000			85C44-2	BPD-01	DD-103	BYA8SI	ED-01	DC51I	BHK-S1	
C65	2000			85D10-12	BPD-0022	DD-232	BYA10D22	ED-0032	UC-5322	5GA-D32	
C66	047	200		94C24-9	BPD-05	DF-503	CU2S47		GEM-2147	ETM-947	
C67	047	400		94C24-34	BPD-05	DF-503	CU4S47		GEM-4147	ETM-947	
C68	033	800		94C24-10	BPD-03	DF-303	CU6S33		GEM-6133	ETM-933	
C69	047	800		94C25-9	BPD-05	DF-503	CU6S47		GEM-6147	ETM-947	
C70	.001	1600		94A2-38							10%
C71	.001	600		94C25-30	BPD-001	DD-103	CU6M1R	GP-1000	GEM-631	97M-D1	
C72	.001	400		94C25-31	BPD-001	DD-103	CU4M1R	GP-1000	GEM-431	97M-D1	
C73	4700			85C44-21	BPD-0047	DD-472	BYA10D47	ED-0047	UC-5247	5GA-D47	
C74	.022	800		94C25-36	BPD-03	DF-303	CU6S22	ED-03	GEM-6223	97M-S22	
C75	3900			85B21-398	1467-0039	D6-402	1WS6D9	ED-004	UC-534	17M-339	10%
C76	390			85B21-391	1468-0039	DD-391	5WS739	ED-390	UC-5339	17M-339	10%
C77	330			85B21-331	1468-0033	DD-331	5WS733	ED-330	UC-5333	17M-339	10%

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP	VOLT	ADMIRAL PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No	MALLORY PART No	SPRAGUE PART No	
C78	.0047	600	94C25-15		BPD-0047	DD-472	CUD6S47	GP- 4700	GEM-6247	97M-D47	
C79	178-									
	780		66A30-3							
C80	10000		85D10-41		BPD-01	DD-103	BYA8SI	ED-01	DC51I	SHK-S1
C81	047	400	94C25-34		BPD-05	DF-503	CU4S47		GEM-4147	ETM-947
C82	1	600	94C25-7		P6BN-1	DF-104	CUD6P1		GEM-601	ETM-P1
C83	220	3000	65D10-69							N1500 5%
C84	150	3000	65D10-59							N1500 5%
C85	047	1000	64A2-30		P10BN-05		CUB10S47		GEM-10147	10TM-947
C86	047	200	94C25-39		BPD-05	DF-503	CU2S47		GEM-2147	ETM-947
C87	5000		65C44-1		BPD-005	DD-502	BYA10DB	ED-005	DC52S	SHK-D5
C88	5000		65C44-1		BPD-005	DD-502	BYA10DB	ED-005	DC52S	SHK-D5
C89	5000		65C44-1		BPD-005	DD-502	BYA10DB	ED-005	DC52S	SHK-D5
C90	01	600	64A2-25		BPD-01	DD-103	CUB6S1	GP-10000	GEM-611	97M-S1
C91	10000	1600	85D10-55		P6BN-01	6D16-104	CUB6S1		GEM-6161	97M-D1

Note 1. 1000MF, 5%, 500V ceramic NPO Tem. Coefficient (Part #85C10-123) used in early production.
Note 2. Run 18 and higher use a .047MFD @ 1000V in this application.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	ADMIRAL PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500 K	½	75C1-87	B-60	A47-500K-Z	Q13-133	U48	Volume
B	Shaft			Not. Req.	X38-3	Not Req.	Not Req.	
C	Switch			KB-1	S WE-13	T6-1	U8-36	
R3A	1000Ω	½	75C12-82	AB-504		Q17-108	U8	Contrast
B	Shaft			AE-4		Not Req.	Not Req.	
R3A	200K	½	75D12-83	B-68	A47-200K-B	Q31-139	U48	Vert. Hold
B	Shaft			Not. Req.	X38-3	Not Req.	Not Req.	
R4A	100K	½	75C30-44	AB-560	A47-100K-E	Q31-138	PTA8L	Brightness-Note 1
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R5A	2.5Meg	½	75C20-42	AB-3	A47-2500-S	Q31-112	SU-81	Vert. Lin.
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R6A	2.5Meg	½	75C20-41	AB-83	A47-2.5Meg	Q31-239	SU-865	Height
B	Shaft			AK-19	RN-3 S	TQ	Not Req.	

Note 1. Alternate part #75C30-43 may be used in some versions.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA			NOTES
	OHMS	WATT	ADMIRAL PART No.	IRC PART No.		
R7	680K 5%		80B8-684	BTS-680K 5%		
R8	8200Ω		80B8-823	BTS-8200		
R9	1500Ω		80B8-152	BTS-1500		
R10	470Ω		80B8-471	BTS-470		
R11	330Ω		80B8-331	BTS-330		
R12	330Ω		80B8-331	BTS-330		
R13	10K		80B8-103	BTS-10K		
R14	10K		80B8-103	BTS-10K		
R15	100K		80B8-104	BTS-100K		
R16	15K		80B8-153	BTS-15K		
R17	150K		80B8-154	BTS-150K		
R18	4.7Meg		80B8-475	BTS-4.7Meg		
R19	15K		80B8-153	BTS-15K		
R20	1000Ω		80B8-103	BTS-1000		
R21	10K		80B8-103	BTS-10K		
R22	1300Ω		80B8-132	BTS-1300		
R23	12K		80B8-123	BTS-12K		
R24	3900Ω		80B8-392	BTS-3900		
R25	27K	2		BTS-27K	Note 1	
R26	33K	2		BTS-33K	Note 1	
R27	1Meg		80B8-105			
R28	4700Ω		80B8-472		Note 2	
R29	68K 5%		80B7-154			
R30	5600Ω		80B8-562			
R31	100K 5%		80B7-104			
R32	330		80B8-331			
R33	2.2Meg		80B7-245			
R34	33Ω		80B7-331	BTS-330 5%	Note 2	
R35	68Ω		80B28-44	BTS-68		
R36	330Ω		80B8-331	BTS-330		
R37	100Ω		80B8-101	BTS-100		
R38	2.7Meg		80B8-275	BTS-2.7Meg		
R39	1.3Meg		80B7-135	BTS-1.3Meg		
	5%			5%		
R40	100Ω		80B8-101	BTS-100		
R41	8800Ω	2	80B20-882	BTS-8800		
R42	15K		80B8-153	BTS-15K		
R43	270K		80B8-274	BTS-270K		
R44	120K		80B8-124	BTS-120K		
R45	1000Ω		80B8-102	BTS-1000		
R46	18K		80B8-183	BTS-18K		
R47	100Ω		80B8-101	BTS-100		
R48	100K 5%		80B8-104	BTS-100K 5%		
R49	560K		80B8-564	BTS-560K		
R50	8200Ω		80B8-822	BTS-8200		

ITEM No.	RATING		REPLACEMENT DATA			NOTES
	OHMS	WATT	ADMIRAL PART No.	IRC PART No.		
R51	3300		80B7-335	BTS-330 5%		
R52	1.3Meg		80B7-135	BTS-1.3Meg		
	5%	2		5%		
R53	1.3Meg		80B7-135	BTS-1.3Meg		
	5%	2		5%		
R54	330Ω	2	80B20-331	BTS-330		
R55	2.7Meg		80B8-275	BTS-2.7Meg		
R56	47K		80B8-473	BTS-47K		Note 4
R57	330K		80B8-334	BTS-330K		Note 5
R58	6800Ω		80B8-682	BTS-6800		Note 6
R59	3300Ω		80B8-332	BTS-3300		Note 7
R60	15K		80B8-153	BTS-15K		
R61	15K		80B8-153	BTS-15K		
R62	3300Ω	2	80B8-332	BTS-3300		Note 7
R63	47K		80B20-473	BTS-47K		Note 8
R64	220K		80B8-224	BTS-220K		
R65	220K		80B8-224	BTS-220K		
R66	15K		80B8-153	BTS-15K		
R67	2.2Meg		80B8-225	BTS-2.2Meg		
R68	56K		80B8-563	BTS-56K		
R69	1Meg		80B8-105	BTS-1Meg		
R70	4700Ω	2	80B20-472	BTS-4700		
R71	680Ω		80B8-681	BTS-680		
R72	560Ω		80B8-561			
R73	560Ω		80B8-561			
R74	100K 5%		80B7-104			
R75	100K 5%		80B7-104			
R76	470K		80B8-474			
R77	4.7Meg		80B8-475			
R78	33Ω	1	80B4-330	BTA-33		
R79	150K		80B8-154	BTS-150K		
R80	5600Ω		80B8-562	BTS-5600		
R81	82K		80B8-823	BTS-82K		
R82	5600Ω		80B8-562			
R83	1500Ω		80B8-152	BTS-1500		
R84	1Meg 5%		80B7-108	BTS-1Meg 5%		
R85	100Ω		80B8-101	BTS-100		
R86	470K		80B8-474	BTS-470K		
R87	100Ω		80B8-101	BTS-100		
R88	10K	10	61B30-3	PWW0-10K		
R89	2200Ω		80B8-222			
R90	4.7K 5%		80B7-247			
R91	10Ω	5	61A25			
R92	50Ω	20	61B2-32	2D-50		
R93	470K		60B8-474	BTS-470K		

Note 1. Some versions may use 47K, 1W in parallel with R35 and R36 (Part #60R14-473) or a single 1K, 4W (Part #61B24-480) in this application.
Note 2. Some versions may use a 3300Ω or 6800Ω in this application.
Note 3. Manufacturer recommends 5% replacement.
Note 4. Later versions may use a 27K in this application
Note 5. Later versions may use 150K in this application.
Note 6. Later versions may use a 3300Ω in this application.
Note 7. Later versions may use a 1500Ω in this application.
Note 8. Not used in later versions.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No.	USE	REPLACEMENT DATA						NOTES
		ADMIRAL PART No	Halldorson PART No	Merit PART No	RCA TYPE No.	Ram PART No	Thordarson PART No	Triad PART No
T1	Vert. Output	78B43-0	Z1807 ①	A-2824	226T1	V315	A-8141	35S54
T2	Yoke-Horiz. (SMH) (90°)-Vert. (STMH)	84D87-18	DP807 ②	MDP-65 ③	232T2 ③	T90F19/4B ③	DY-16A ③	A-11GX Y-41 & NW2 ③
M9	Rear Cover & Centering Device	94A18-1						
T3	Yoke Clamp	19A12-2						
	Horiz. Output	79D74-2		HVO-135		X135 ③ ④	HO-264 ③ ④	FLY-107 ③ ④
	Alt Horiz. Output	79C80-10						

① Cut and tape blanking lead. Drill new mounting holes.
② Use original rear cover and centering device and original horizontal damping network.
③ Trim mounting bracket to duplicate original, and use original mounting brackets.
④ This part may be superceded by Parts Manufacturer's introduction of special unit for this application.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type Is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
4	4	4	4	3	3	3	3
3	3	3	3	6	6	6	6
1	1	1	1	1	1	1	1

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI.	SEC.	ADMIRAL PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T4	2700Ω	3-4Ω	79D33-14	ZU103 1/2	A-3025	A-3332	26S56 ①	S-12X	① Drill one new mounting hole ② Tape tap on pri. winding

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V C IMP	ADMIRAL PART No	QUAM PART No	
SP1	4"	PM	3-4Ω	76B12-1	4 A07	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA		NOTES
		ADMIRAL PART No.	MEISSNER PART No.	
L1	UHF Ant. Coil	94C13-80		
L2	UHF Grid Coil	94C13-53		
L3	Calib. Choke	94C13-56		
L4	UHF IF Output Coil	94C13-54		
L5	UHF IF Input Coil	94C18-54		
L6	VHF Ant. Trans.	94C18-58		
L7	VHF Ant. Coils	94C18-100	Channel 3-13, Incl. complete wafer assembly	
L8	VHF Ant. Coil	94C18-67		
L9	VHF RF Coil	94C18-68		
L10	VHF RF Coils	94C18-99	Channels 2-13, Incl. complete wafer assembly	
L11	IF Trap	94C18-70		
L12	VHF RF Coil	94C18-71	Channel 13	

ITEM No.	USE	REPLACEMENT DATA				NOTES
		ADMIRAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L21	Fil. Choke			19-1007	BC-560	4592
L22	1st. Video IF	72C132-26				
L23	2nd. Video IF	72C132-25				
L24	3rd. Video IF	72C176-2				
L25	RF Choke	79A8-5		19-3001	TF-189	6175
L26	Resonant Choke	79B24-1				
L27	RF Choke	79A8-9		19-1002	BC-583	4606
L28	Series Peaking Coil	79B11-1		19-3680 *		6148 *
L29	Series Peaking Coil	79B5-8		19-3300 a		6155 a
L30	Shunt Peaking Coil	79B11-1		19-3680 *		6148 *
L31	1st. Sound IF	72C132-30				
L32	2nd. Sound IF	72C132-19				
L33	Quadrature Coil	72C132-18				

* Paralled with 10K resistor.
a Parallel with 33K resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ADMIRAL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	
L34	92Ω		94C17-7	19-1576 *	TV-162 *	6210 *			HB-6 *	18.6-45 Millihenries

* Enlarge mounting hole.

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE @ CURRENT (1000 μa)	ADMIRAL PART No.	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No
L35	200A	85Ω	1.4 Hy.	74B18-19	C3040	C-3994	C-3237	26C41	C-34X

PARTS LIST AND DESCRIPTIONS (Continued)

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ADMIRAL PART No.	REPLACEMENT DATA
K1	Ant. Isolation	470MMF, .3-1Meg	63B10-1	Centralab RC-471
K2	Ant. Isolation	470MMF, .3-1Meg	63B10-1	Centralab RC-471
K3	Ant. Isolation	470MMF, .3-1Meg	63B10-1	Centralab RC-471
K4	Ant. Isolation	470MMF, .3-1Meg	63B10-1	Centralab RC-471
K5	Vert. Blanking	10000MMF, 10000MMF, 2700Ω, 56K	63C6-12	Aerovox PA-169 Centralab PC-314 Sprague 102C12

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT (Measured)	ADMIRAL PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	.200A	93A4-2 ①	1090A ①	1N1007 ②	RS300SL ①	6S300 ①	300 ①	
M2	.200A	93A4-2 ①	1090A ①	1N1007 ②	RS300SL ①	6S300 ①	300 ①	
M3		93A5-2 ①③	1215 ①④		1T1①④			

① Selenium Type ② Germanium Type ③ Horiz. Phase Det. ④ Two Required

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ADMIRAL PART No.	CBS PART No.	SYLVANIA PART No.	
M4	1N82A	94D112-57	1N82A	1N82A	UHF Mixer (Clip-in)
M5	1N295		1N60	1N60	Video Det. (Pigtail)

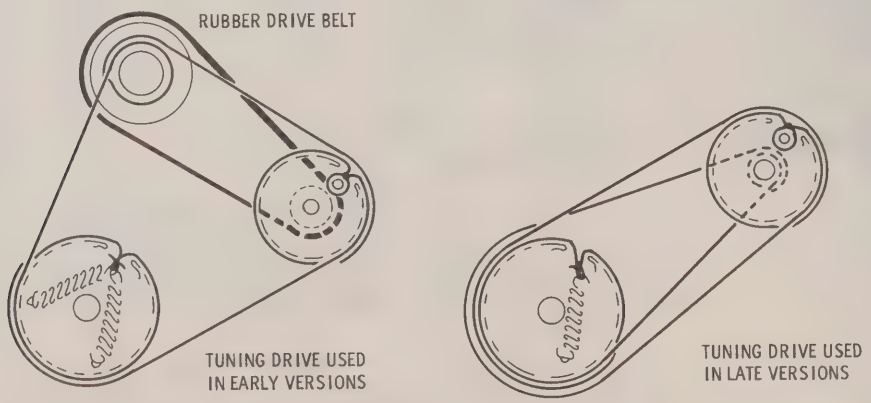
MISCELLANEOUS

ITEM No.	PART NAME	ADMIRAL PART No.	NOTES
M6	Tuner	94D112-1	UHF
M7	Tuner	94C118-1	VHF
M8	Switch	77B59-3	Local-Distant, Slide Type (DPDT)
M9	Centering Device	94A116-1	Includes rear yoke cover
M10	Ion Trap	94B15-5	
	Printed Board	A5290-7	Video IF & Detector. Complete with components, less tubes
		A5290-17	Video IF & Detector. Complete with components, less tubes NOTE: Only this board supplied for replacement. See alternate circuit application.
	Printed Board	A5291	Sync & Sweep. Complete with components, less tubes
		A5291-18	Sync & Sweep. Complete with components, less tubes. NOTE: Only this board supplied for replacement. See alternate circuit application.

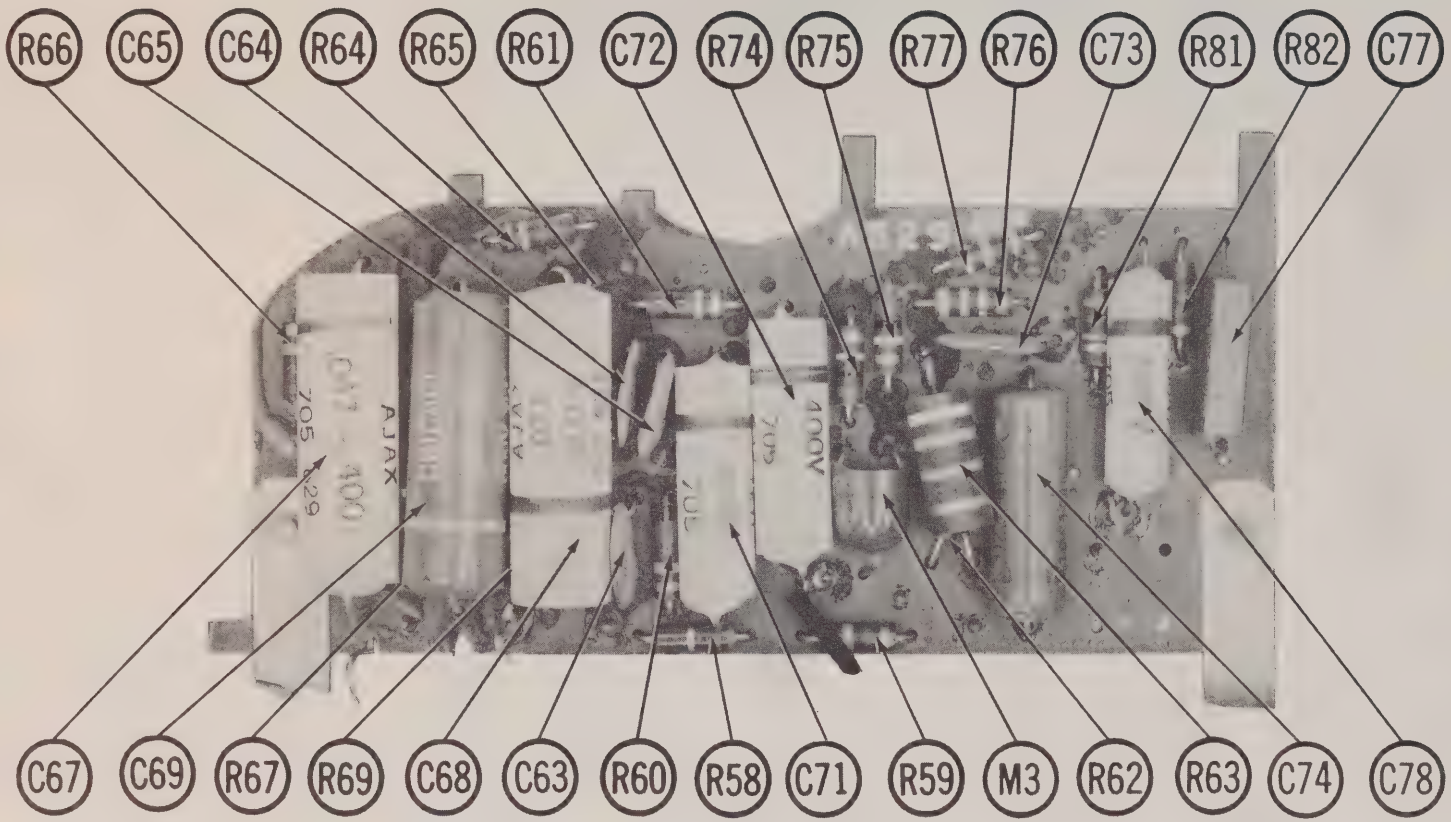
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

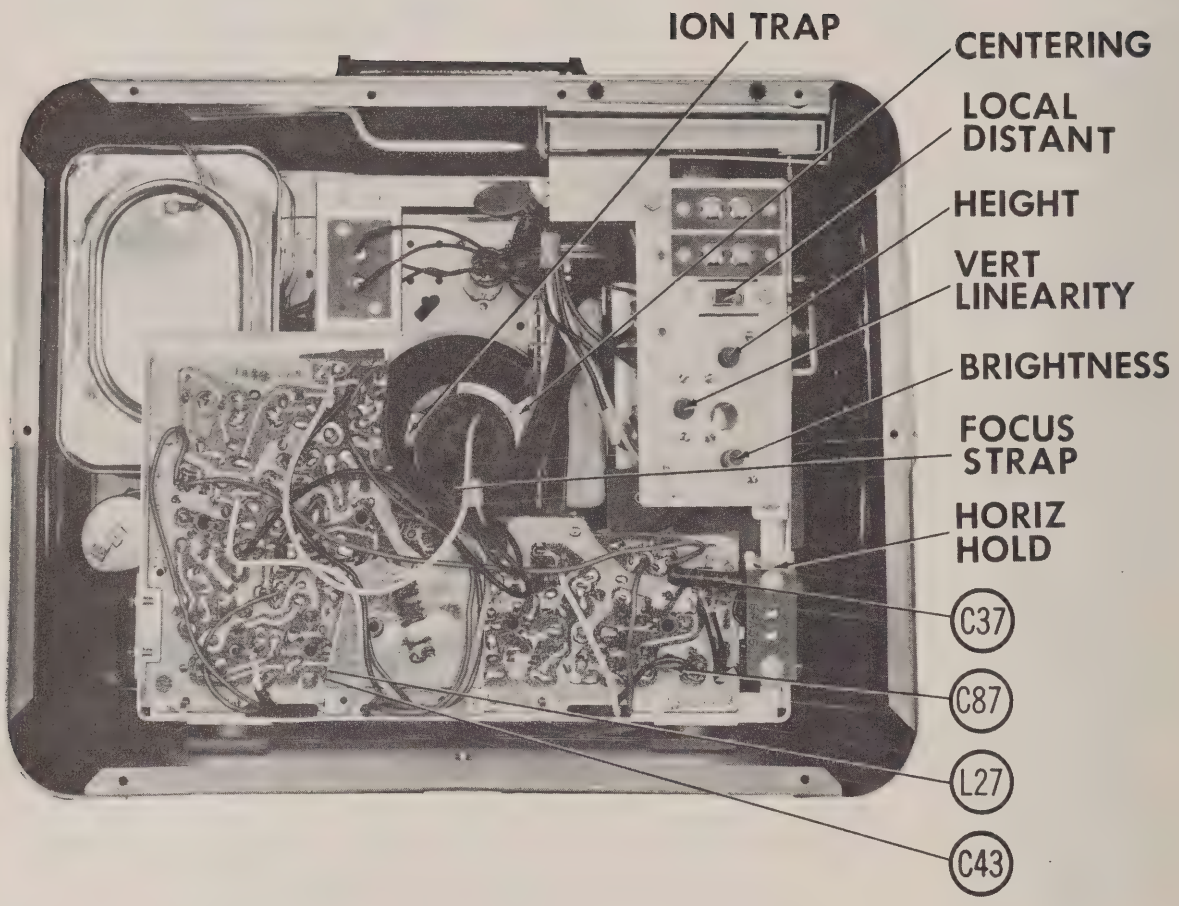
NAME	PART NO.	DESCRIPTION
Safety Glass	21D93-1	Clear, Model TS171
Safety Glass	21D93-2	Tinted, Models TS172AL, ALN, TS173AL
Bezel	23E275-1	Model TS171
Bezel	23E275-2	Models TS172AL, ALN
Bezel	23E275-3	Model TS173AL
Knob	33D202-19	Channel Selector - Model TS171
Knob	33D202-21	Channel Selector - Models TS172AL, ALN, TS173AL
Knob	33D202-23	Fine Tuning
Knob	33D202-18	UHF Indicator
Knob	33A175-2	On-off-volume, contrast, vert. hold - Model TS171
Knob	33A175-4	On-off-volume, contrast, vert. hold - Models TS172AL, ALN, TS173AL
Cabinet	34E109-1	Model TS171
Cabinet	34E109-2	Models TS172AL, ALN
Cabinet	34E109-3	Model TS-173AL
Handle	37C145-1	Chrome Plate - Model TS171
Handle	37C145-2	Gold Plated - Models TS172AL, ALN, TS173AL



DRIVE CORD STRINGING



SYNC PRINTED BOARD



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.

2. Set the brightness and contrast controls for a normal picture.

3. Turn the horizontal hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

4. Turn the horizontal hold slowly counter clockwise until the picture just falls into sync.

5. Turn to an unused channel. If vertical lines appear near the center of the screen, slowly adjust the horizontal drive trimmer (B1) until white lines disappear.

6. If in step 5 the horizontal drive was adjusted, tune in a TV station and repeat steps 3 and 4. Check horizontal sync by switching off channel and back again.

PHOTOFACT* Folder

*TRADE MARK

AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

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MODEL WG-4029A

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	Airline	MODELS
		WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C
SUPPLIER	Montgomery Ward & Co., 619 Chicago Ave., Chicago, Ill.	
TYPE SET	Television Receiver	
TUBES	Fifteen	
POWER SUPPLY	110-120 Volts AC, 60 Cycle	RATING 155 Watts, 1.4 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)	

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AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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*TRADE MARK

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from the front.
2. Remove 2 metal screws and the left trim plate.
3. Remove 3 push-on type control knobs.
4. Remove 5 wood screws, 1 metal screw and the rear cover.
5. Loosen 2 wood screws and remove the antenna terminal board.
6. Remove 2 speaker leads.
7. Remove 2 wood screws holding the top chassis braces to the rear of the cabinet.
8. Remove 4 cabinet bolts from the bottom.
9. Remove the chassis.
10. Remove 2 speaker nuts and the speaker.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

MODEL WG-4029A

MODELS

WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs, 2 metal screws and the right hand trim plate. Set the fine tuning at the center of its range. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 4 push-on type control knobs from the front. Remove 4 metal screws and the 2 trim plates. Remove 3 push-on type control knobs and the safety glass.

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Set the horizontal hold at the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSES

A 7.5Ω fusible resistor (R74) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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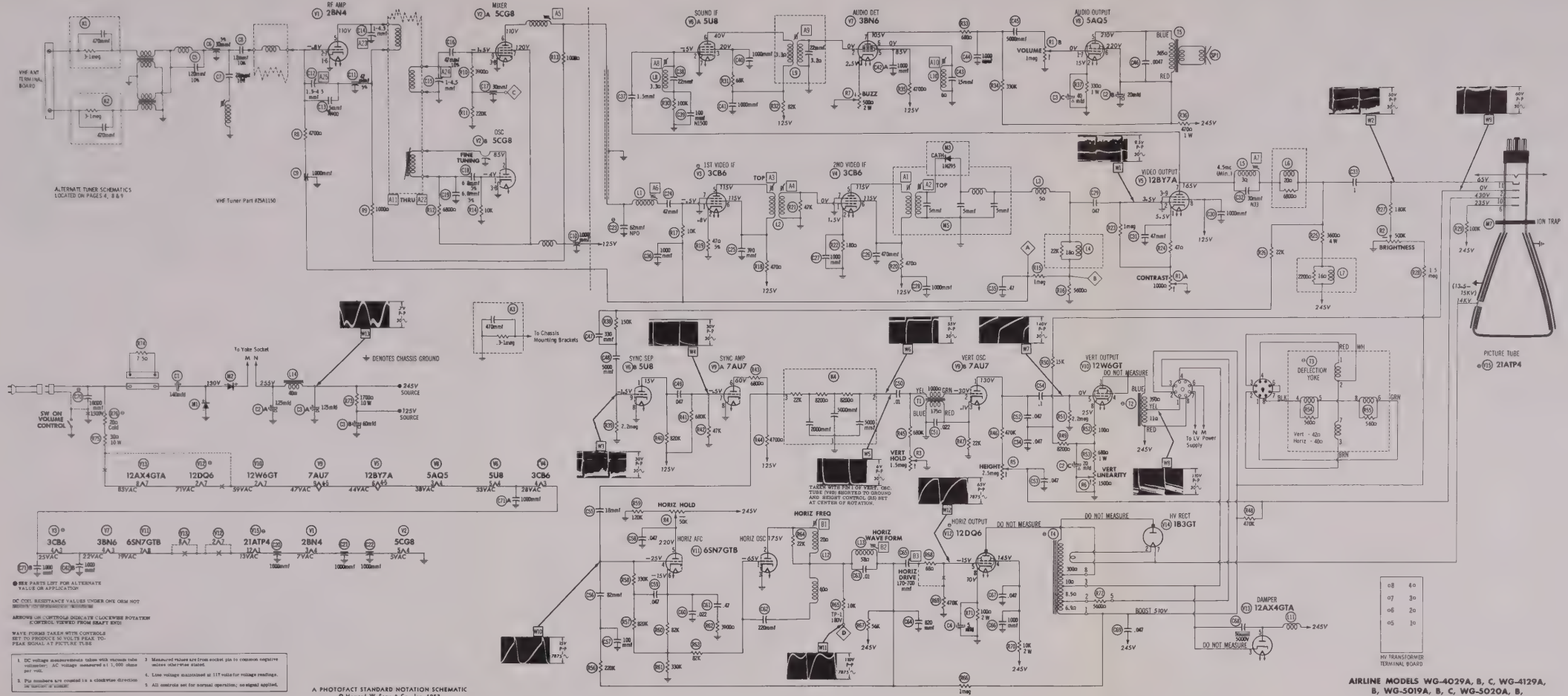
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed. Reproduction or use, without express permission, of editorial or pictorial content, in any manner, is prohibited. No patent liability is assumed with respect to the use of the information contained herein. © 1957 Howard W. Sams & Co., Inc., Indianapolis 5, Indiana. Printed in U.S. of America

G939

DATE 8-57 SET 367 FOLDER 3


RF AMP 2BN4
MIXER 5CG8
OSC 5CG8
SOUND IF 5U8
AUDIO DET 3BN6
AUDIO OUTPUT 5AQ5
1ST VIDEO IF 3CB6
2ND VIDEO IF 3CB6
VIDEO OUTPUT 12BY7A
SYNC SEP 5U8
SYNC AMP 7AU7
VERT OSC 7AU7
VERT OUTPUT 12W6GT
DO NOT MEASURE
HORIZ OUTPUT 12DQ6
HORIZ OSC 6SN7GTB
HV RECT 1B3GT
DAMPER 12AX4GTA
PICTURE TUBE 21ATP4
ION TRAP
DEFLECTION YOKE
BRIGHTNESS
CONTRAST
VOLUME
VERT HOLD
HEIGHT
VERT LINEARITY
HORIZ HOLD
HORIZ FREQ
HORIZ AFC
HORIZ WAVE FORM
HORIZ DRIVE
BOOST 510V
VHF ANT TERMINAL BOARD
ALTERNATE TUNER SCHEMATICS LOCATED ON PAGES 4, 8 & 9
VHF Tuner Part #25A1150
SW ON VOLUME CONTROL
To Yoke Socket
To Chassis Mounting Brackets
DENOTES CHASSIS GROUND
245V SOURCE
125V SOURCE
To LV Power Supply
HV TRANSFORMER TERMINAL BOARD
12AX4GTA 12DQ6 12W6GT 7AU7 12BY7A 5AQ5 5U8 3CB6
83VAC 71VAC 59VAC 47VAC 44VAC 38VAC 33VAC 28VAC
3CB6 3BN6 6SN7GTB 21ATP4 2BN4 5CG8
25VAC 22VAC 19VAC 13VAC 7VAC 5VAC
TAKEN WITH LEAD OF VERT. OSC. TUBE (V9b) SHORTED TO GROUND AND HEIGHT CONTROL (R5) SET AT CENTER OF ROTATION.
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC ARE GIVEN
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK TO-PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements taken with vacuum tube voltmeter; AC voltage measured at 1,000 ohms per volt.
2. Fu numbers are counted in a clockwise direction as viewed at socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
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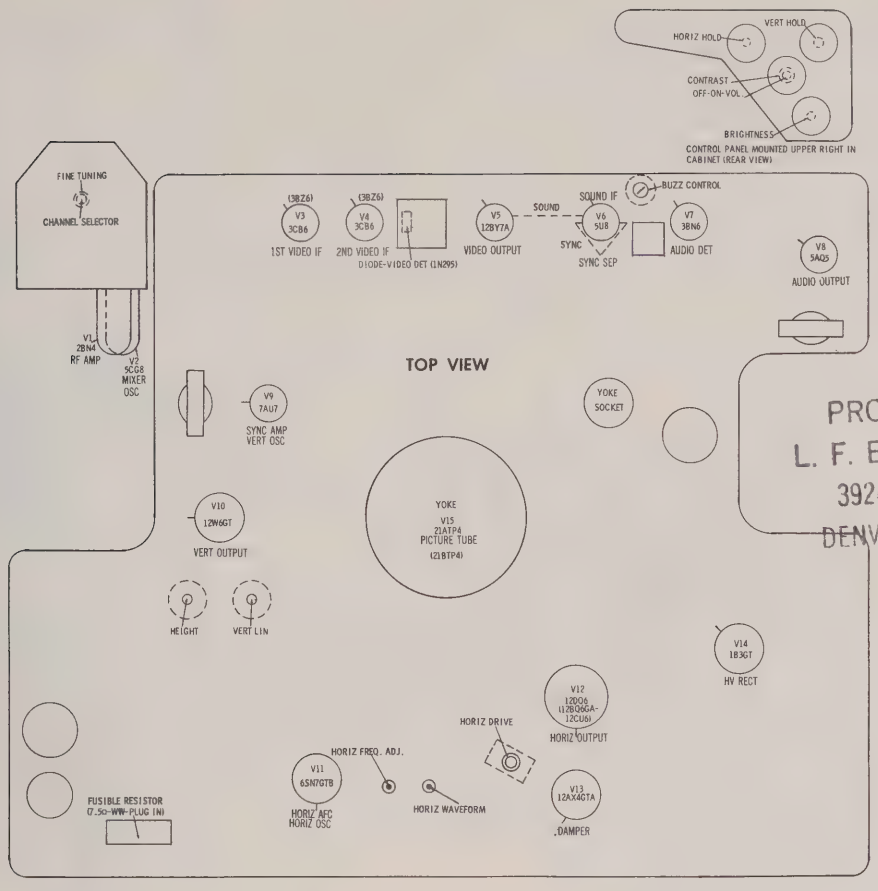
AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

TUBE PLACEMENT CHART



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TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

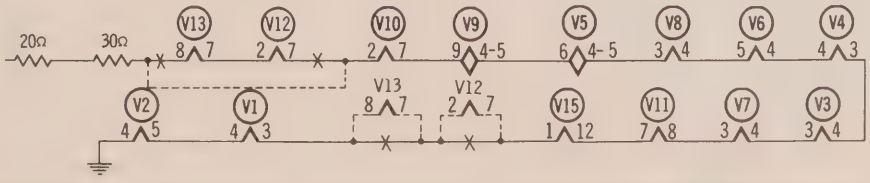
POWER SUPPLY FAILURE
No raster, no sound - **Fusible Resistor (R74), Rectifiers (M1, M2)**

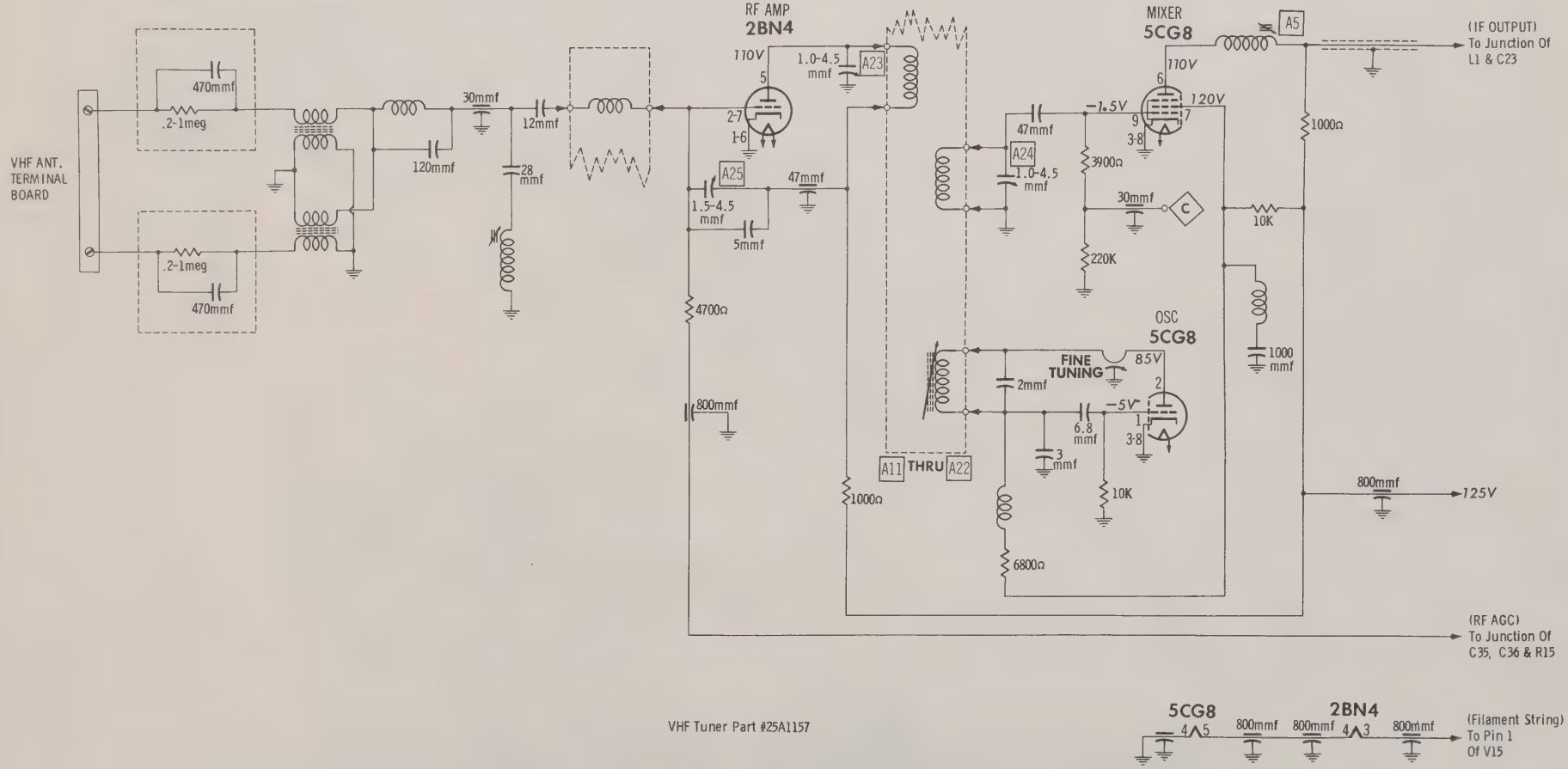
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, Diode (M3), V5**
No pic, no sound, has snow - **V1, V2**
No pic, has sound, has raster - **V5, V15**
Has pic, no sound - **V6, V7, V8**

SYNC FAILURE
No vert. sync - **V6, V9**
No horiz. sync - **V6, V9, V11**
No vert. or horiz. sync - **V6, V9**

SWEEP FAILURE
No raster, has sound - **V11, V12, V13, V14, V15**
No vertical deflection - **V9, V10**
Poor vert. linearity or foldover - **V9, V10**
Poor horiz. linearity or foldover - **V11, V12, V13**
Narrow picture - **V11, V12, V13, M1, M2**
Vert. off freq. - **V9,**
Horiz. off freq. - **V11**

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below.)





VHF Tuner Part #25A1157

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ALTERNATE TUNER SCHEMATIC

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CHASSIS BOTTOM VIEW-INDUCTOR AND ALIGNMENT IDENTIFICATION

AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, WG-5119A, B, WG-5120A, B, C

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.

VIDEO IF ALIGNMENT

Connect the negative lead of a 5.5 volt bias supply to point Ⓐ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	.001MFD	High side to pin 1 (grid) of 2nd. Video IF tube (V4). Low side to chassis.	44.0MC (10MC Swp)	42.8MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point Ⓑ. Low side to chassis.	A1, A2	Adjust for maximum amplitude of response curve similar to Fig. 1 with markers as indicated. Increase sweep output to provide 4 volts peak to peak on scope. Readjust A1 and A2 if necessary.
2.	"	High side to pin 1 (grid) of 1st. Video IF tube (V3). Low side to chassis.	"	42.8MC 43.9MC 44.5MC 45.75MC	"	"	A3, A4	Adjust for maximum gain and symmetry of response curve similar to Fig. 2 with 45.75MC at 55% and the 43.9MC and 44.5MC markers at equal levels.
3.	1000MMF Ceramic Capacitor	High side to point Ⓒ. Low side to chassis. For UHF receivers, high side to ungrounded tube shield floating over mixer-oscillator tube (V2). Low side to chassis.	"	"	"	"	A5, A6	Adjust for maximum gain and symmetry of response curve similar to Fig. 3 with 45.75MC marker at 50%, and the 43.9MC and 44.5MC markers at equal levels. If necessary, repeat steps 1, 2 and 3 for desired curves.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.005MFD	High side to point Ⓑ. Low side to chassis.	4.5MC (Unmod)	Any non-interfering channel	DC probe to pin 11 (cathode) of picture tube. Common to chassis.	A7	Adjust for MINIMUM deflection.

SOUND IF ALIGNMENT

Tune in a TV station and reduce the signal strength to the receiver antenna terminals by use of an attenuator or similar device until a hiss is heard in the sound.
Adjust A8, A9, A10 and the buzz control (R7) for maximum undistorted sound and MINIMUM buzz. If the hiss disappears during alignment, further reduce the signal strength.

VHF OSCILLATOR ALIGNMENT

Connect the negative lead of a 4.5 volt bias supply to point Ⓐ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point Ⓑ. Low side to chassis.	A11	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should fall at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A12	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A13	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A14	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A15	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A16	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A17	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A18	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A19	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A20	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A21	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A22	

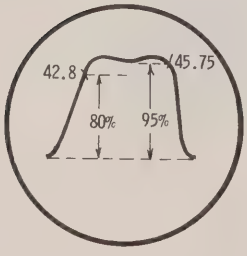


FIG.1

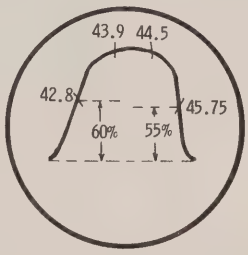


FIG.2

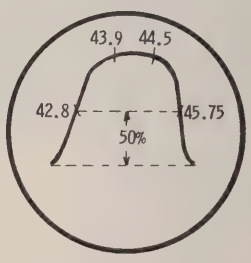


FIG.3

ALIGNMENT INSTRUCTIONS (cont)

VHF RF AND MIXER ALIGNMENT FOR TUNERS PART #25A1150, 25A1154, 25A1157

Connect the negative lead of a 1.5 volt bias supply to point (A). For Tuner part #25A1150.
Connect the negative lead of a 2.5 volt bias supply to point (A). For Tuners part #25A1154, 25A1157.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.25MC 197.75MC	10	Vert. Amp. thru detector (Fig. 6) to pin 5 (plate) of 1st. video IF (V3). Low side to chassis.	A23, A24	Adjust A23 and A24 for response similar to Fig. 5 with markers on shoulders of curve.
7.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	"	"	A25	Adjust for MINIMUM response curve amplitude.
8.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustment of A23 and A24 with channel switch set to that channel Check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

VHF RF AND MIXER ALIGNMENT FOR TUNER PART #25A1138

Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10K to point (C). Low side to chassis.	A26, A27, A28	Adjust for response curve similar to Fig. 5 with markers above 90%.
10.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel, make compromise adjustments of A26, A27 and A28 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

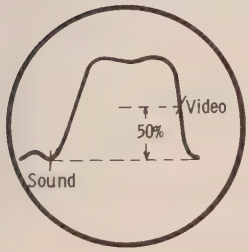


FIG. 4

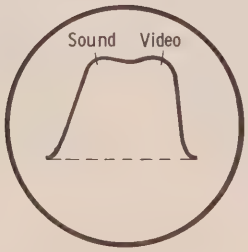


FIG. 5

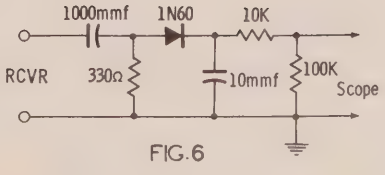
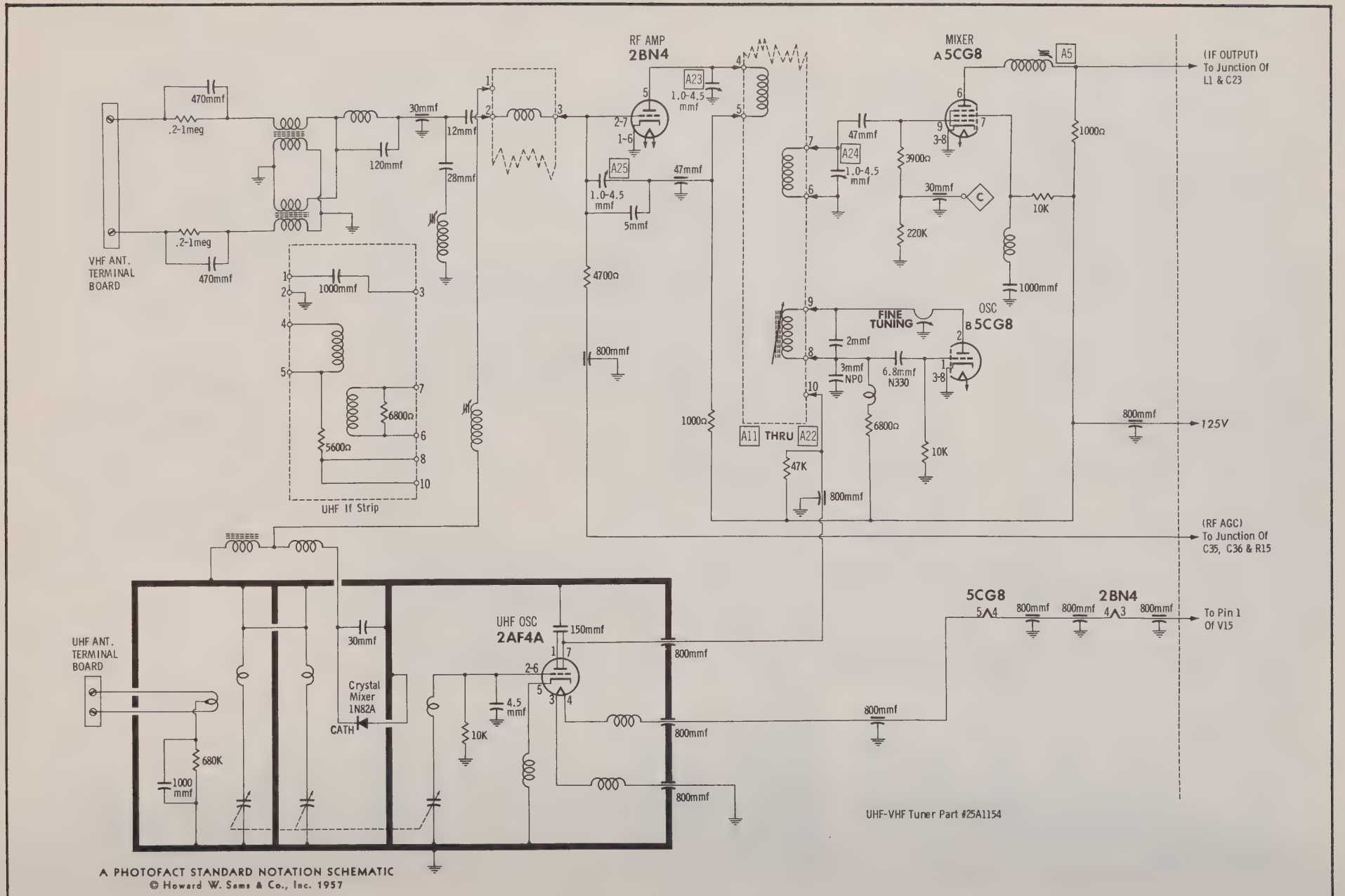


FIG. 6



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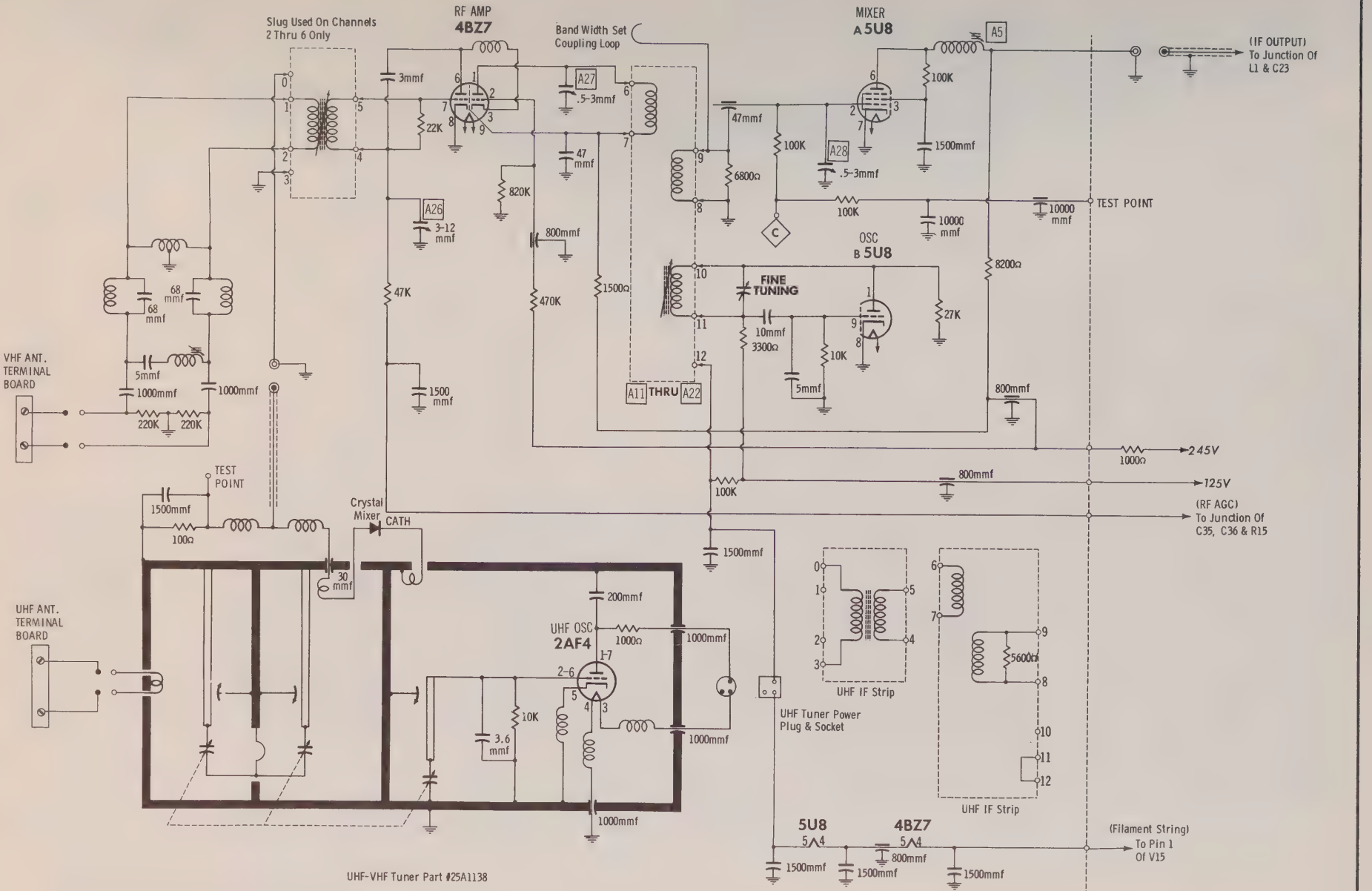
ALTERNATE TUNER SCHEMATIC



A PHOTOFACT STANDARD NOTATION SCHEMATIC

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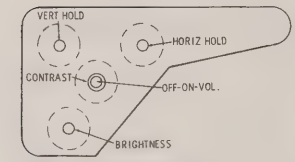
ALTERNATE TUNER SCHEMATIC

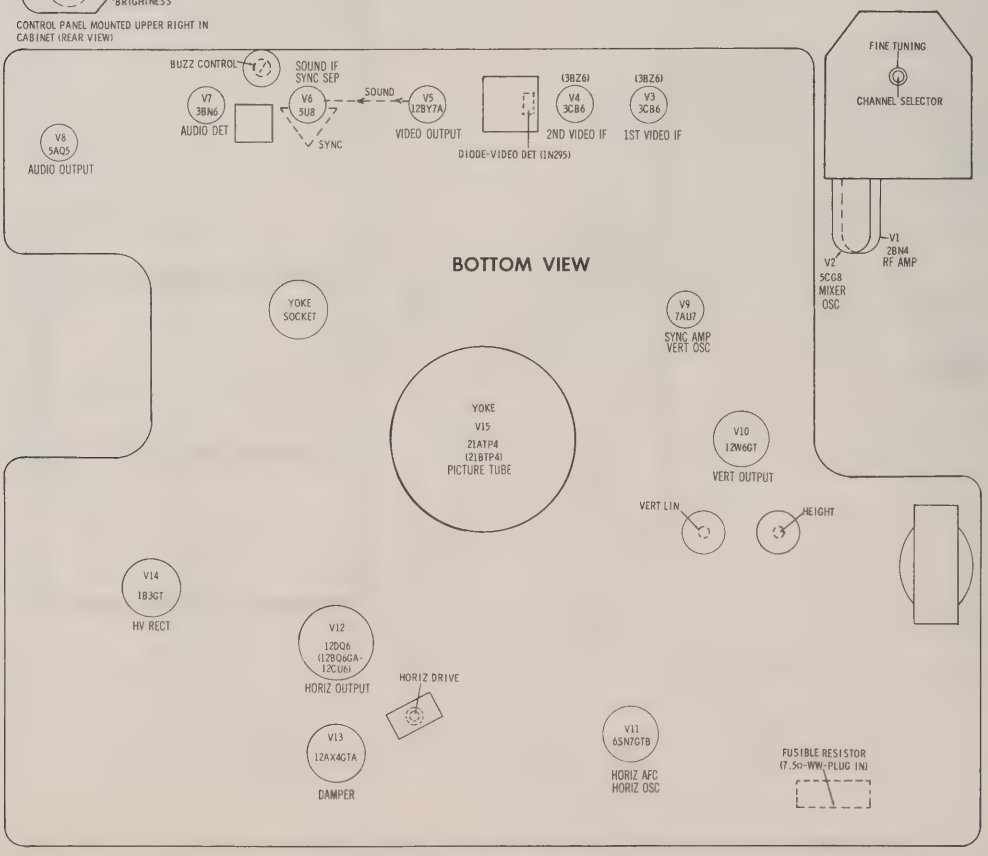
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	2BN4	0Ω	1Meg	2Ω	1.5Ω	†2700Ω	0Ω	1Meg		
V2	5CG8	10K	†8500Ω	0Ω	0Ω	1.5Ω	†2700Ω	†1700Ω	0Ω	220K
V3	3CB6	1Meg	47Ω	6Ω	7Ω	†2200Ω	†2200Ω	0Ω		
V4	3CB6	.1Ω	180Ω	7Ω	8Ω	†2200Ω	†2200Ω	0Ω		
V5	12BY7A	• 450Ω	1Meg	0Ω	10Ω	10Ω	11Ω	†3700Ω	†1700Ω	0Ω
V6	5U8	†820K	100K	†150K	8Ω	9Ω	†82K	0Ω	0Ω	2.2Meg
V7	3BN6	• 350Ω	3.3Ω	5Ω	6Ω	†6400Ω	6Ω	†330K		
V8	5AQ5	0Ω	330Ω	10Ω	9Ω	†875Ω	†510Ω	0Ω		
V9	7AU7	• ‡2.3Meg	• 1.2Meg	175Ω	11Ω	11Ω	†13K	40K	0Ω	12Ω
V10	12W6GT	TP	14Ω	†400Ω	†400Ω	2.2Meg	TP	12Ω	•1100Ω	
V11	6SN7GTB	410K	†56K	0Ω	1.5Meg	• †20K	410K	3.5Ω	5Ω	
V12	12DQ6	NC	16.5Ω	TP	†10K	470K	TP	14Ω	100Ω	TOP CAP ‡10Ω
V13	12AX4GTA	TP	NC	¶	NC	†40Ω	NC	16.5Ω	18.5Ω	
V14	1B3GT		PINS	1 THRU 8	HAVE	INFINITE	RESISTANCE			TOP CAP ‡310Ω
V15	21ATP4	2Ω	• 22K	PIN 6 †100K	PIN 10 ‡470K	PIN 11 • 300K	PIN 12 3.5Ω			

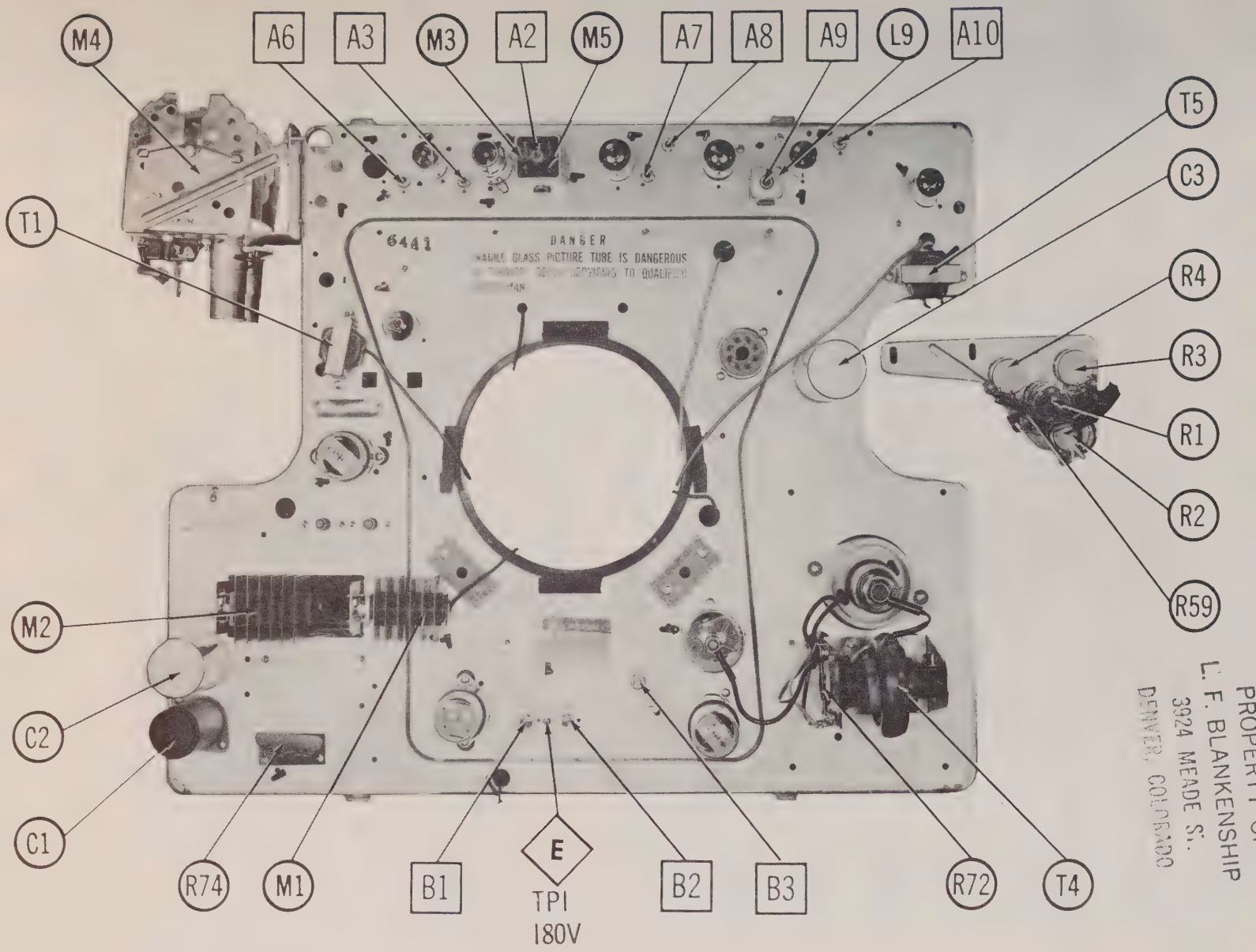
† MEASURED FROM OUTPUT OF M2.
• THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
‡ MEASURED FROM PIN 3 OF V13.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROYLTIC CAPACITOR IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT



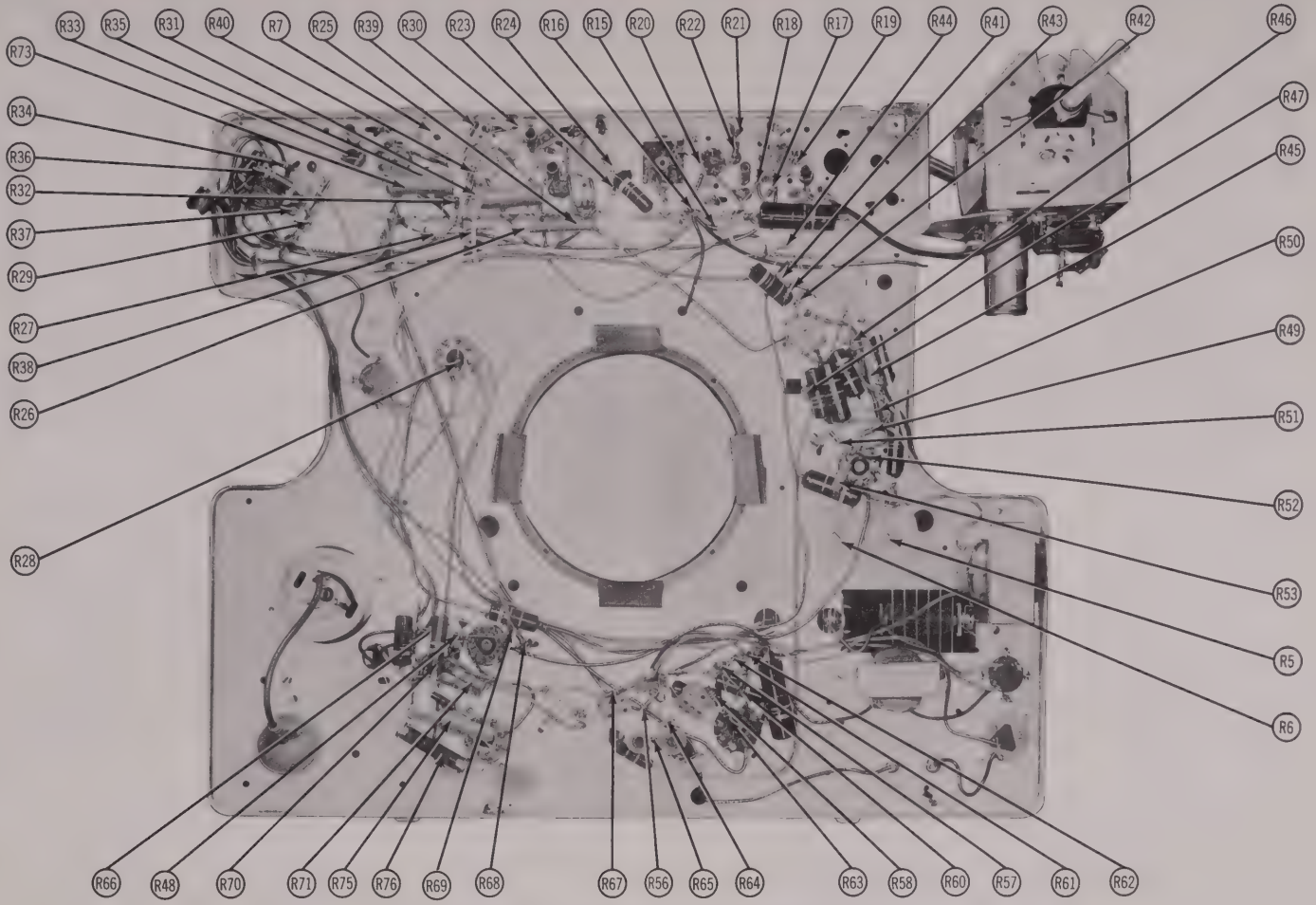
CONTROL PANEL MOUNTED UPPER RIGHT IN CABINET (REAR VIEW)



TUBE PLACEMENT CHART



CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

AIRLINE MODELS WG-4029A, B, C, WG-4129A, B, WG-3019A, B, C, WG-3020A, B, WG-5119A, B, WG-5120A, B, C

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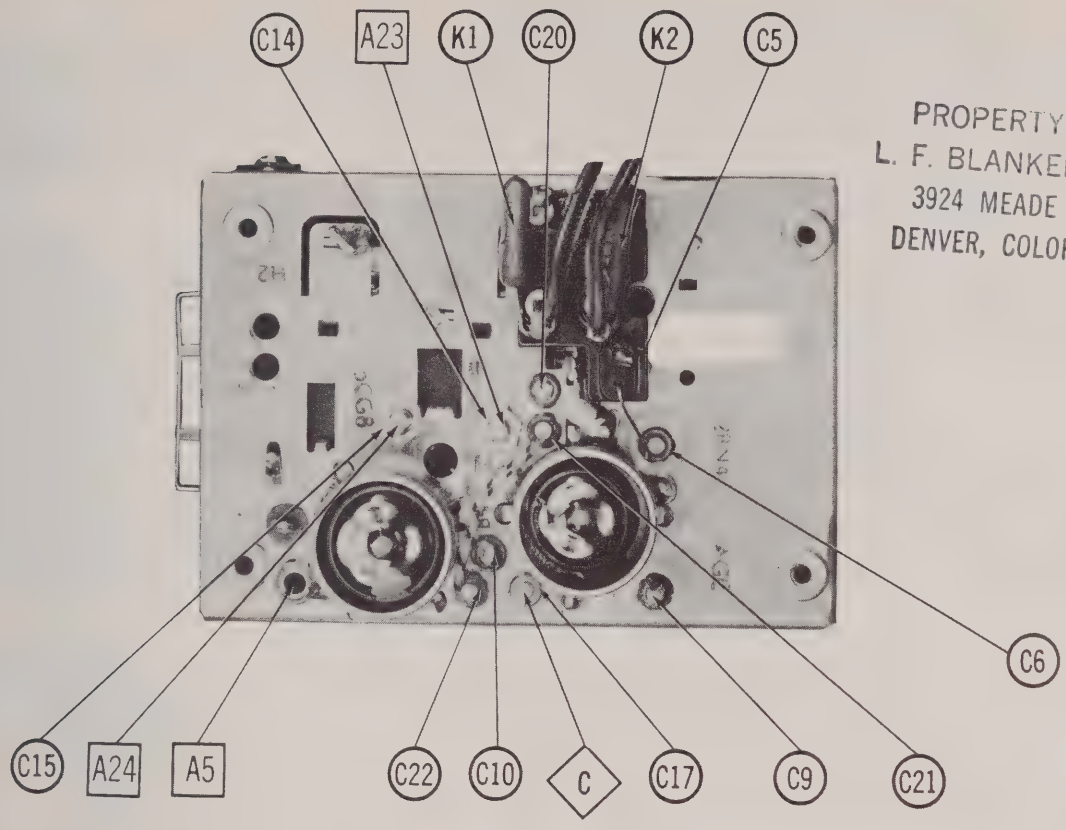
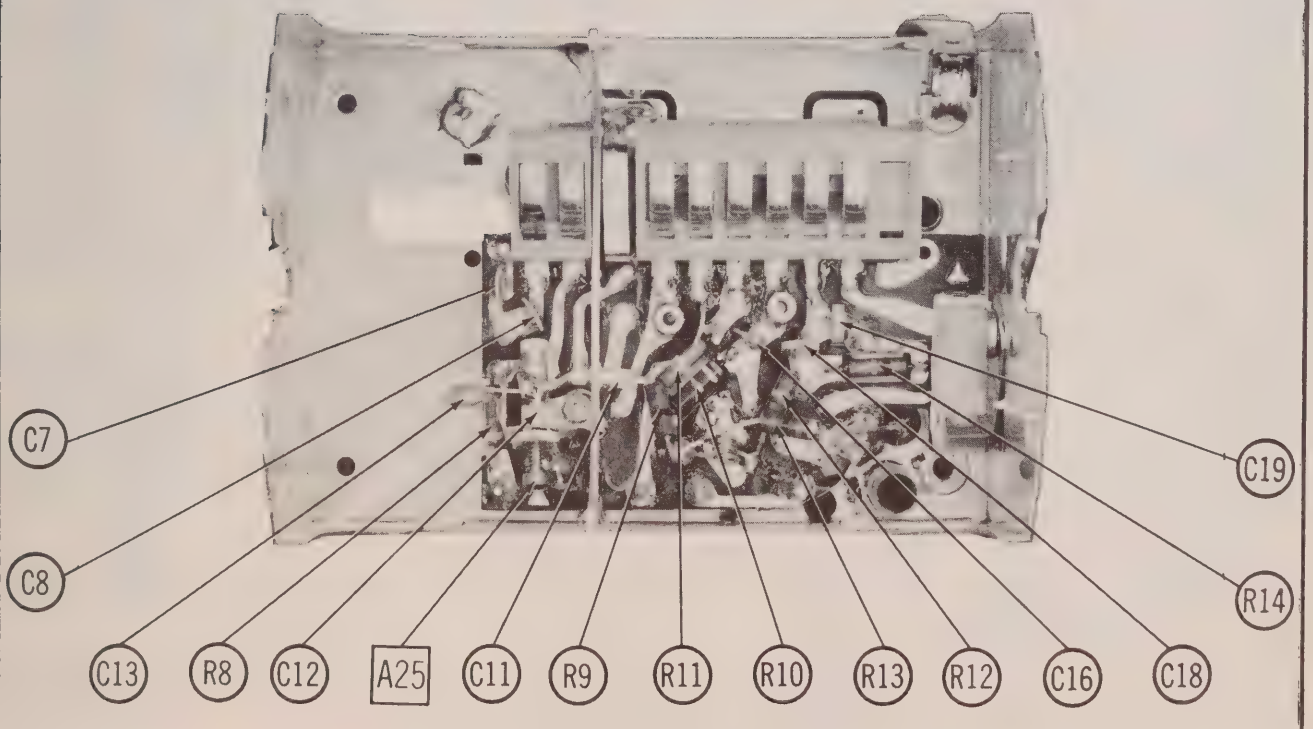


RF TUNER-TOP VIEW



RF TUNER-BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	2BN4	
V2	Mixer-Oscillator	5CG8	
V3	1st. Video IF Amp.	3CB6	Note 1
V4	2nd. Video IF Amp	3CB6	
V5	Video Output	12BY7A	
V6	Sound IF-Sync Sep	5U8	
V7	Audio Det	3BN6	
V8	Audio Output	5AQ5	
V9	Sync Amp.-Vert. Osc.	7AU7	
V10	Vert Output	12W8GT	
V11	Horiz AFC-Horiz. Osc	6BN10/B	
V12	Horiz Output	12DQ6	Note 2
V13	Damper	12AX6GTA	
V14	HV Rectifier	1B3GT	

Note 1. A 2BZ6 is used in this application in models ending with the suffix "B" or "C".
Note 2. Some versions may use a 12BQ6GA or 12CU6 in this application.

PICTURE TUBE

ITEM No	REPLACEMENT DATA			NOTES
	AIRLINE PART No	SYLVANIA PART No		
V15	21ATP4	21ATP4A/21ATP4	21ATP4 1 21ATP4A 2 21ATP4A 3 21BTP4 2 21BTP4 3	1 Aluminized 2 Silver screen '8 5 '
	21BTP4		21ATP4, 21ATP4A 2 21ATP4A 3	

ELECTROLYTIC CAPACITORS

ITEM No	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	AIRLINE PART No	AEROVOX PART No	CORNELL DUBILIER PART No	MALLORY PART No	TYRAMID PART No	SANGAMO PART No	SPRAGUE PART No	
C1	140	150	45X241	AF185-23	RA025U	FP1U	TMS-24	T-055	TVL-1428	
C2A	±25	300	45X431	AF184-02-80	CKO380	FP218		Q-017	R2S75 *	
B	±20	300			SR205	TC36		MT-0525		
C	±20	50								
C3A	±125	300	45X420	AF183-99-80	DO044	FP420, 26		T-115	TVL-3574. 6	
B	±60	300			SR505	TC65		MT-0550		
C	±40	50								
C4	5	50	45X418	PRS50V5	SBR5-50	TC30	ML5-50	MMT-0505	TE-1305	

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No	RATING		REPLACEMENT DATA							NOTES
	CAP	VOLT	AIRLINE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No.	MALLORY PART No	SPRAGUE PART No	
C5	120					L10T12	ED-120			10%
C6	30									5%
C7	33									10%
C8	12									10%
C9	1000			EF-001	MFT-1000				502C-D1	
C10	1000			EF-001	MFT-1000				502C-D1	
C11	47									
C12	1 5-									
	4.5				538-5	532-B				
C13	5				538-5	532-B				N900
C14	1-4.5				538-5	532-B				
C15	1-4.5				538-5	532-B				
C16	47									10%
C17	50									
C18	5 8									
C19	5.8									
C20	1000			EF-001	MFT-1000				502C-D1	
C21	1000			EF-001	MFT-1000				502C-D1	
C22	1000			EF-001	MFT-1000				502C-D1	
C23	62			TCZ-62	C10Q62C	TCO-62				N750 ①
C24	47			81 47	LT5Q47	GP-47		UC-5447		SGA-Q47
C25	390				LU2T39	ED-390		UC-5339		SGA-T39
C26	470			BPD-00047	BYA0T47	ED-470		UC-5347		SGA-T47
C27	1000			BPD-001	DD-102	BYA5D1	ED-1000	DC5Z1		5HK-D1
C28	1000			BPD-001	DD-102	BYA5D1	ED-1000	DC5Z1		5HK-D1
C29	047	200		BPD-05	DF-503	CUB3B47		GEM-3147		2TM-647
C30	1000			BPD-001	DD-102	BYA5D1	ED-1000	DC5Z1		5HK-D1
C31	47			81 47	D5-470	LT5Q47	GP-47	UC-5447		SGA-Q47
C33	20		4TX668	P468N-1	DF-104	CUB4P1		GEM-402		4TM-P1
C34	.1	400		BPD-08	DF-503	CUB3B47		GEM-3147		2TM-647
C35	.047	300		P288N-47		CUB3P47		GEM-3047		2TM-P47
C36	.47	300		BPD-001	DD-103	BYA5D1	ED-1000	DC5Z1		5HK-D1
C37	1.5			MP0-811.5	TCZ-1R5	C10V1SC	TCO-1.5	ZT-5615		STCCB-V15
C38	33		4TX671	BPD-000033	DF-330	L10Q33	ED-33	UC-5433		SGA-Q33
C39	100									N1500
C40	1000			BPD-001	DD-103	BYA5D1	ED-1000	DC5Z1		5HK-D1
C41	1000			BPD-001	DD-103	BYA5D1	ED-1000	DC5Z1		5HK-D1
C42A	1000)			BPD-K1001	DD5-103	BYC5DD1	ED4-001	DCD5Z1		5HK-D1
B	1000)									
C43	18			BPD-000015	DD-150	L10Q15	ED-15	UC-5415		SGA-Q15
C44	1000			BPD-001	DD-103	BYA5D1	ED-1000	DC5Z1		5HK-D1
C45	5600			BPD-005	DD-502	BYA5D5	ED-005	DC5Z5		5HK-D5
C46	.0047	200		BPD-0047	DF-472	CUB1D47	GP-1700	GEM-3247		2TM-D47
C47	330		4TX570	1484-00033		SR2T33				M8-332
C48	5000			BPD-005	DD-502	BYA5D5	ED-005	DC5Z5		5HK-D5
C49	.047	400		BPD-05	DF-503	CUB4S47		GEM-4147		4TM-647
C50	.01	400		BPD-01	DD-103	CUB4S1	GP-10000	GEM-412		4TM-S1
C51	.033	200		BPD-03	DF-303	CUB2P47	ED-03	GEM-3123		2TM-422
C52	.047	400		BPD-05	DF-503	CUB4S47		GEM-4147		4TM-647
C53	.047	600		BPD-05	DF-503	CUB6S47		GEM-6147		6TM-647
C54	.1	400		P488N-4	DF-104	CUB4P1		GEM-402		4TM-P1
C55	15		RCM30B150K	1484-00015		2SR5Q15				M8-415
C56	53		RCM30B530K	1484-00053		2SR5Q53				M8-482
C57	100			1484-0001		2SR5T1				M8-31
C58	.047	400		BPD-05	DF-503	CUB4S47		GEM-4147		4TM-647
C59	.047	200		BPD-05	DF-503	CUB3S47		GEM-3147		2TM-647
C60	.032	200		BPD-02	DF-303	CUB3S32	ED-03	GEM-3132		2TM-322
C61	.47	300		P288N-47		CUB3P47		GEM-3047		2TM-P47
C62	220			1484-00022		2SR5T22				M8-322
C63	.01	400		BPD-01	DD-103	CUB4S1	ED-01	GEM-411		4TM-S1
C64	820		RCM30B821K	1484-00082		1R5T83				M8-382
C65	170- 700		1TA37I							
C66	1000			BPD-001	DD-103	BYA5D1	ED-1000	DC5Z1		5HK-D1
C67	.047	400		BPD-05	DF-503	CUB4S47		GEM-4147		4TM-647
C68	56	5000	4TX755		DD50-560					75GA-Q56
C69	.047	400		BPD-05	DF-503	CUB4S47		GEM-4147		4TM-647

ITEM No	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	AIRLINE PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No.	MALLORY PART No	SPRAGUE PART No	
C70	.0001	1500		DAC-27	DD5-103	HVE5B1		GRM-1B1	BL-B10	②
C71A	.0005			BPD-2X001	DD2-102	HVE5B1	E02-001	DCD5Z1	S1K-2D1	
B	.1000					RYCD5DB				

① A 10MMF is used in this application in UHF versions.
② A .22MFD ③ 400V is used in this application in models ending with suffix "B" or "C"

CONTROLS

ITEM No	RATING		REPLACEMENT DATA						INSTALLATION NOTES
	RESISTANCE	WATTS	AIRLINE PART No	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	ERIE PART No.	MALLORY PART No	
R1A	1000Ω	½	76X29	F1-4	RTV-579 *			UE-T48	Contrast
B	1Meg	½		RS-1/4		Not Req.		Not Req.	Volume
C	Switch	½		KD-1		Not Req.		Not Req.	
R2A	500K	½	40X394	AB-59	A47-500K-S	Q11-153		U50	Brightness
B	Shaft	½		AK-8	RS-3/16	NQ		DS-37	
R3A	1 5Meg	½	40X395	AB-742	A47-1.5Meg-S	Q11-138		U155	Vert Hold
B	Shaft	½		AK-9	RS-3/16	NQ		DS-37	
R4A	50K	½	40X396	AB-31	A47-50K-S	Q11-125		U35	Horiz. Hold
B	Shaft	½		AK-9	RS-3/16	NQ		DS-37	
R5A	2 5Meg	½	40X396	BX-43	A47-2.5Meg-S	Q11-239		SU-585	Height
B	Shaft	½							
R6A	1500Ω	½	40X399	Not Req.	RN-3	TQ		Not Req.	
B	Shaft	½		AB-8	A47-1500-S	Q11-109		PTA152L	Vert Lin.
R7	500Ω	2	40X397	AK-19	RN-3	TQ		Not Req.	
					39-800			FL-800	Buzz - wire wound

* Disregard tap. Use only 1 section of DPST switch.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No	IRC PART No.	
R8	4700Ω			BTS-4700	
R9	1000Ω			BTS-1000	
R10	3900Ω			BTS-3900	
R11	220K			BTS-220K	
R12	6800Ω			BTS-6800	
R13	1000Ω			BTS-1000	
R14	10K			BTS-10K	
R15	1Meg			BTS-1Meg	
R16	5600Ω			BTS-5600	
R17	10K			BTS-10K	
R18	470Ω			BTS-470	
R19	470 5%			BTS-47 5%	
R20	470Ω				
R21	47K			BTS-47K	
R22	180Ω			BTS-180	
R23	1Meg			BTS-1Meg	
R24	47Ω			BTS-47	
R25	3600Ω	4			
R26	22K			BTS-22K	
R27	180K			BTS-180K	
R28	1.5Meg			BTS-1.5Meg	
R29	100K			BTS-100K	
R30	100K			BTS-100K	
R31	68K			BTS-68K	
R32	82K			BTS-82K	
R33	680Ω			BTS-680	
R34	330K			BTS-330K	
R35	4700Ω			BTS-4700	
R36	470Ω	1		BTA-470	
R37	330Ω	1		BTA-330	
R38	180K			BTS-180K	
R39	2.2Meg			BTS-2.2Meg	
R40	820K			BTS-820K	
R41	680K			BTS-680K	
R43	47K			BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	AIRLINE PART No.	IRC PART No.	
R45	6800Ω			BTS-6800	
R46	4700Ω			BTS-4700	
R45	680K			BTS-680K	
R46	470K			BTS-470K	
R47	22K			BTS-22K	
R48	470K			BTS-470K	
R49	6200K			BTS-6200	
R50	15K			BTS-15K	
R51	2.2Meg			BTS-2.2Meg	
R52	100Ω			BTS-100	
R53	680Ω	1		BTA-680	
R54	560Ω				
R55	560Ω				
R56	220K				
R57	820K				
R58	330K				
R59	120K				
R60	82K				
R61	330K				
R62	2900Ω				
R63	82K			BTS-82K	
R64	22K			BTS-22K	
R65	10K			BTS-10K	
R66	1Meg			BTS-1Meg	
R67	56K			BTS-56K	
R68	68Ω			BTS-68	
R69	470K			BTS-470K	
R70	10K	2		BTS-10K	
R71	100Ω	2		BTB-100	
R72	5600Ω			BTS-5600	
R73	1700Ω	10	43X294		
R74	7.5Ω		47X360	FR7.5	
R75	30Ω	10	43X295	1 3/4A-30	
R76	20Ω		43X339		Note 1

Note 1. A temperature coefficient resistor (20Ω cold).

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA								
		AIRLINE PART No.	Halldorson PART No	Merit PART No	RCA TYPE No.	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	Vert Oscillator	54X10	B6702	A-3003	209T1 ①	V405	A-8125	26A03	A-97X
T2	Vert Output	51X13A	Z1900 ①②	A-2823 ①②		V308 ③	A-8148 ④	26S7B ⑤⑥	A-118X ⑤
Alt. Vert Output		51X13	Z1900 ①②	A-2823 ①②		V308 ③④	A-8148 ④	26S7B ⑤⑥	A-118X ⑤
T3A	Yoke-Horiz (24MHz)	54A287-1C	DF601 ⑤⑥	MDF-21	235DN ⑤⑥	P90P18/43	DY-16A ⑤⑥	T-16 ⑤⑥	Y-41 &
B	(90) Vert. (40MH)			⑤⑥		⑤⑥		⑤	NW21 ⑤
Alt. Yoke		9A2357							
M6	Yoke Rear Cover & Centering Device	2A453							YC1
	Yoke Clamp	302X61							
T4	Horiz Output	53X259A	FB42 ⑤	HVO-36	235T1 ①	P094 ①	* HO-263 *	FLY-18 ⑤	D-86 ①
	Alt Horiz. Output	52X359	* ⑤	* ⑤	* ⑤			* ⑤	* ⑤

① Drill new mounting hole(s)
② Use 8 to 1 horiz ratio.
③ Connect as auto transformer.
④ Cut and tape green lead.
⑤ Mount with leads out top and connect same as original.
⑥ Use original yoke rear cover and centering device.
* This part may be superceded by Parts Manufacturer's introduction of special unit for this application.

*HORIZONTAL OUTPUT TRANSFORMER CONNECTION DATA

Use Original Width Coil Unless Replacement Type is Listed

ORIGINAL TERMINAL CONNECTIONS	Halldorson Replacement Connections	Merit Replacement Connections	RCA Replacement Connections	Ram Replacement Connections	Stancor Replacement Connections	Thordarson Replacement Connections	Triad Replacement Connections
6	9	9	9	9	8	9	5
3	7 or 5	7 or 5	7 or 5	7 or 5	3	7 or 5	3
2	See Note ① NC	See Note ① NC	See Note ① NC	See Note ① NC	2	See Note ① NC	YCT
1	1	1	1	1	1	1	1
Special Rates →	①	①	①	①		①	

① Install new horizontal damping network, consisting of approximately 100MMF ① 2KV and 1000Ω ② 1W connected in series,across yoke terminals #1 and #3.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE		REPLACEMENT DATA					NOTES
	PRI	SEC	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No	Thordarson PART No	Triad PART No.	
T5	8200Ω	8-8Ω	51X180	Z1000 1½	A-2900 1½	A-3337 1	24S60 1 2	S-51X 1½	1 Drill one new mounting hole 2 Tape center tap on primary winding.

SPEAKER

ITEM No	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V C IMP	AIRLINE PART No	QUAM PART No	
SP1	5"	PM	8-8Ω	12A540	5A0TH25.4	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	1st. Video IF	9A2389		TV-131	6238	
L2	2nd. Video IF	9A2390				
L3	Resonant Choke	9A2375			6156 ▲	30 Microhenries
L4	Shunt Peaking Coil	38A33	19-3300 ▲			330 Microhenries, wound on 23K resistor
L5	4.5MC Trap	9A2366	20-1004	TV-151	1469	
L6	Series Peaking Coil	38A33	19-4400 *	TV-190 *	6152 *	350 Microhenries, wound on 6800Ω resistor
L7	Shunt Peaking Coil	38A35	19-4321 *		6154 *	250 Microhenries, wound on 3300Ω resistor
L8	1st. Sound IF	9A2366	20-1004	TV-151	1469	
L9	2nd. Sound IF	9A2365	17-3496	TV-115	6203	
L10	Quadrature Coil	9A2367	30-1006		1480	
L11	RF Choke	9A2380	19-1001		6804	1.8 Microhenries

▲ Parallel with 33K resistor.
* Parallel with 5800Ω resistor.
+ Parallel with 2200Ω resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES.		REPLACEMENT DATA							NOTES
	PRI.	SEC.	AIRLINE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No	
L12	80Ω		9A237I		TV-155	6211 *			83-7	13-63 Millihenries tapped @ 60Ω
L13	98Ω		9A237Z						83-5 *	Horiz Freq 7.5-35.5 Millihenries Horiz. Waveform

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D.C. RESISTANCE	INDUCTANCE @ CURRENT (.001 Ac)	AIRLINE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No	Thordarson PART No.	Triad PART No.
L14	.260A	40Ω	7 HY.	52X96-3	C9037 ①	C-2996 ①	C-2326 ①	26C64 ①	C-37X

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	AIRLINE PART No.	REPLACEMENT DATA	
K1	Antenna Input	.3-1Meg, 470MMF	76X11		
K2	Antenna Input	.3-1Meg, 470MMF	76X11		
K3	Chassis Isolation	.5-1Meg, 470MMF	76X11		
K4	Vert. Integrator	2000MMF, 5000MMF, 5000MMF, 22K, 6200Ω, 6200Ω	76X7	Aerovox Centralab Cornell-Dubilier Erie Sprague	PA-100 PC-100 1157M1 1408-01 V-1

RECTIFIERS

ITEM No.	RATING	REPLACEMENT DATA						NOTES
	CURRENT (Measured)	AIRLINE PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	.280A	66X16 ①	1090A ①	1N1007 ②	R8306S6 ①	66300A ①	100 ①	
M2	.280A	66X16 ①	1090A ①	1N1007 ②	R8306S6 ①	66300A ①	100 ①	

① Selenium Type. ② Germanium Type.

AIRLINE MODELS WG-8029A, B, C, WG-4129A, B, WG-5019A, B, C, WG-5020A, B, C WG-5119A, B, WG-5120A, B, C

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		AIRLINE PART No.	CBS PART No.	SYLVANIA PART No.	
M3	1N295 *		1N60	1N60	Video Det. (Pigtail)

* A CK706 or a 1N60 may be used in some versions.

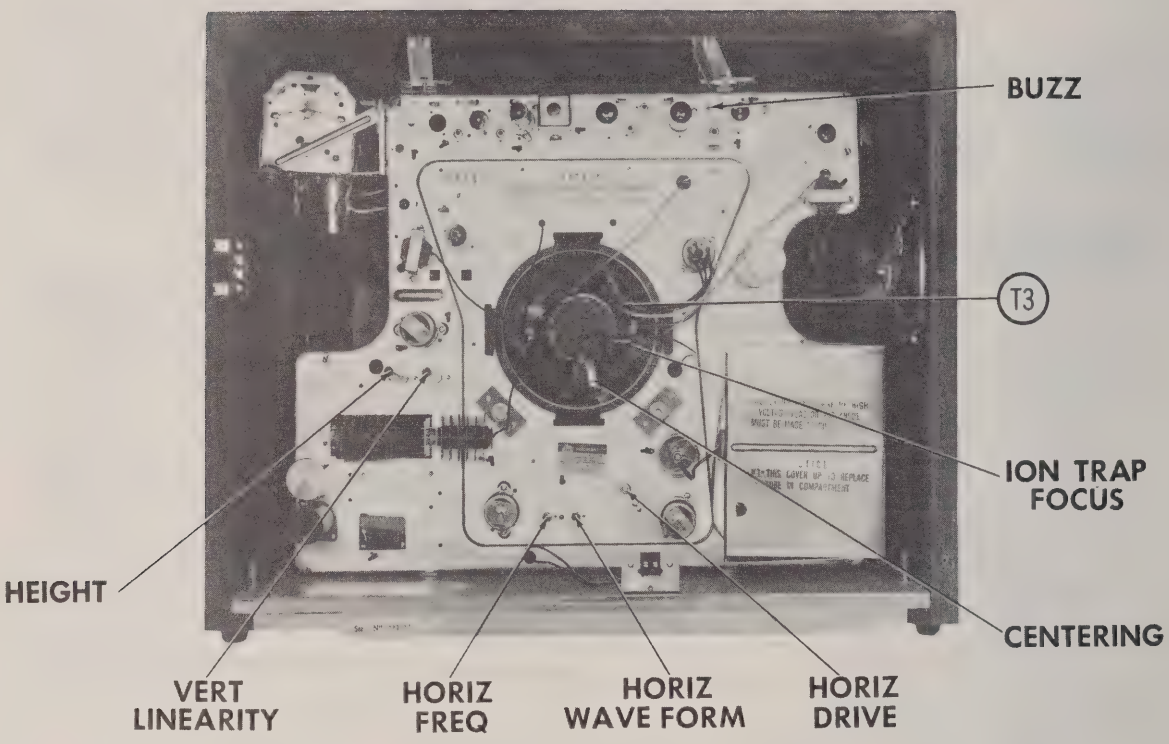
MISCELLANEOUS

ITEM No.	PART NAME	AIRLINE PART No.	NOTES
M4	Tuner	25A1150	VHF - Used in Models ending with suffix "A".
	Tuner	25A1138	UHF-VHF - Used in Models ending with suffix "A".
	Tuner	25A1154	UHF-VHF - Used in Models ending with suffix "B"
	Tuner	25A1157	VHF - Used in Models ending with suffix "C"
M5	Crystal Det. Assy.	9A2391	Includes 3rd. Video IF, peaking coil, caps. and M3
M6	Centering Device	2A435	Includes rear yoke cover
M7	Ion Trap	2A421	

CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Safety Glass	17X190	
Mask	38A14	Gold
Mask	38A18	Silver
Knob	10A856-1	Channel Selector - VHF Models (Mahogany or oak)
Knob	10A863-1	Channel Selector - UHF Models (Mahogany or oak)
Knob	S-38A40	Fine Tuning - VHF Models (Mahogany or oak)
Knob	S-38A34	UHF Channel Selector - UHF Models (Mahogany or oak)
Knob	10A858-2	Fine Tuning - UHF Models (Mahogany)
Knob	10A858-3	Fine Tuning - UHF Models (Oak)
Knob	10A862-1	On-off-volume - VHF Models (Mahogany or oak)
Knob	10A865-1	On-off-volume - UHF Models (Mahogany or oak)
Knob	S-38A35	Contrast (Mahogany or oak)
Knob	10A861-1	Control
Leg	81X4-4	Oak
Leg	81X4-5	Mahogany



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably with a test pattern. Set the contrast control for normal contrast.

1. Set the horizontal hold control in the center of its range and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

2. Connect the vertical amplifier of the scope to point ⓓ. Connect the low side of the scope to chassis. Adjust the horizontal waveform slug (B2) until waveform is similar to Fig. 7. While making this adjustment, keep the picture in sync with the horizontal hold control.

3. Turn the horizontal hold control fully clockwise. Turn B1 clockwise until the picture is just ready to pull-in sync.

4. Turn the horizontal hold control fully counter clockwise. The picture should remain in sync. Momentarily remove the signal by switching off the channel and back again. Retouch B1 if necessary.

5. While receiving a signal from a station, turn the contrast control fully counter clockwise and turn the brightness control up so that the picture is washed out in appearance. Turn the horizontal drive trimmer (B3) clockwise until white vertical bars appear in the left center of the raster, then slowly turn B3 counter clockwise until the white bars disappear.

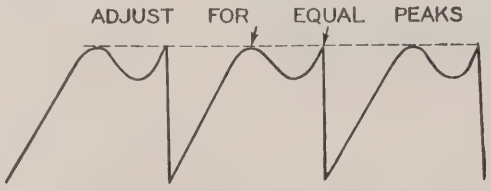
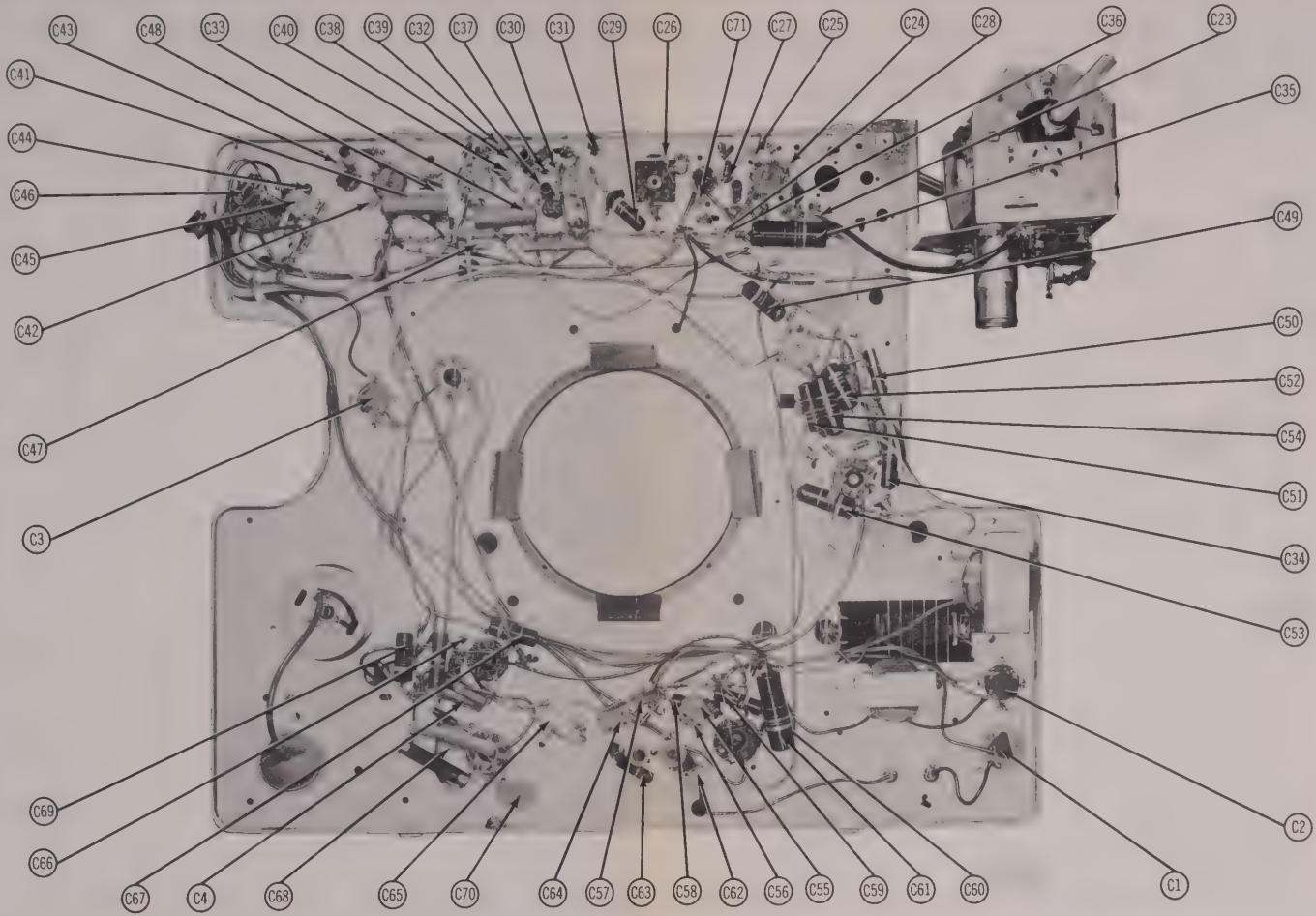
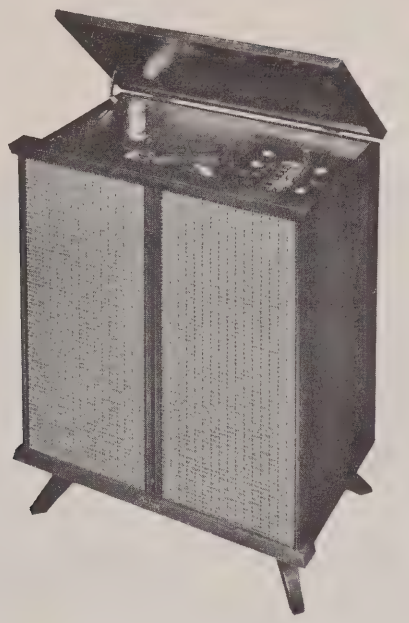


FIG. 7



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



PROPERTY OF
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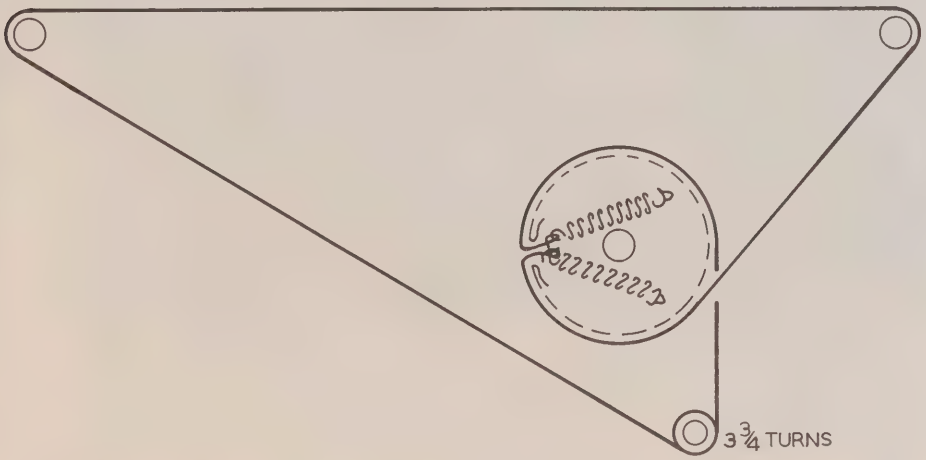
3924 MEADE ST.
DENVER, COLORADO

ANDREA
MODEL CRP-24W

TRADE NAME	Andrea Model CRP-24W (Tuner Model 101X, Amplifier P24W)
MANUFACTURER	Andrea Radio Corp., 27-01 Bridge Plaza North, Long Island City 1, N. Y.
TYPE SET	AC Operated FM-AM Tuner with Amplifier Chassis and 3 Speed Automatic Record Changer
TUBES	Tuner: Nine Amp.: Seven
POWER SUPPLY	110-120 Volts AC - 60 Cycles
	RATING .43 Amp. @ 117 Volts AC (48 Watts) Tuner RATING .8 Amp. @ 117 Volts AC (90 Watts) Amp.
TUNING RANGE - BROADCAST	540KC-1700KC
	FREQ. MOD. 88MC-108MC

FOR SERVICE INFORMATION ON RECORD CHANGER — SEE SIMILAR GARRARD MODEL RC-121 - PHOTOFACT SET 355 FOLDER 4.

ANDREA
MODEL CRP-24W



DIAL CORD STRINGING

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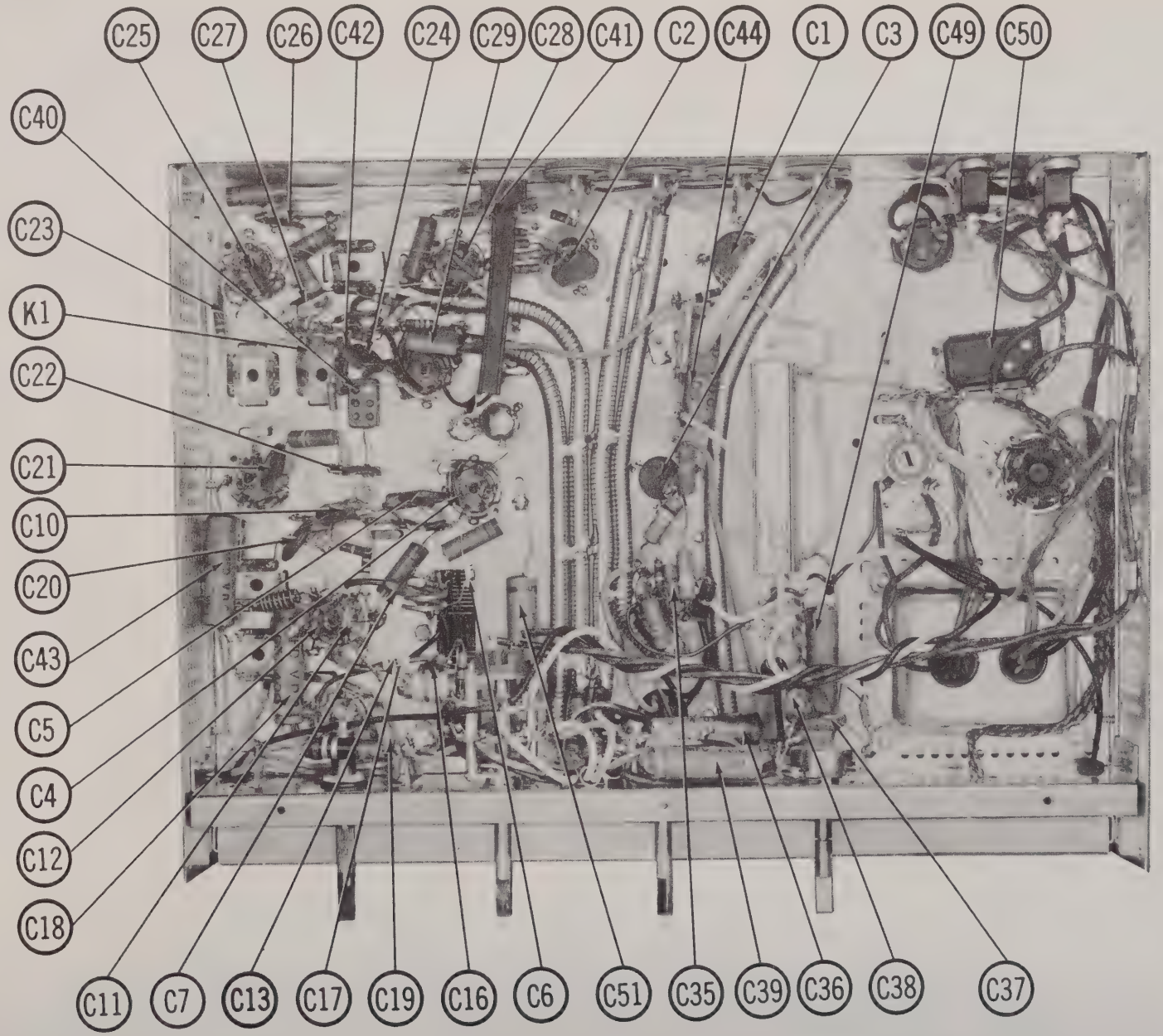
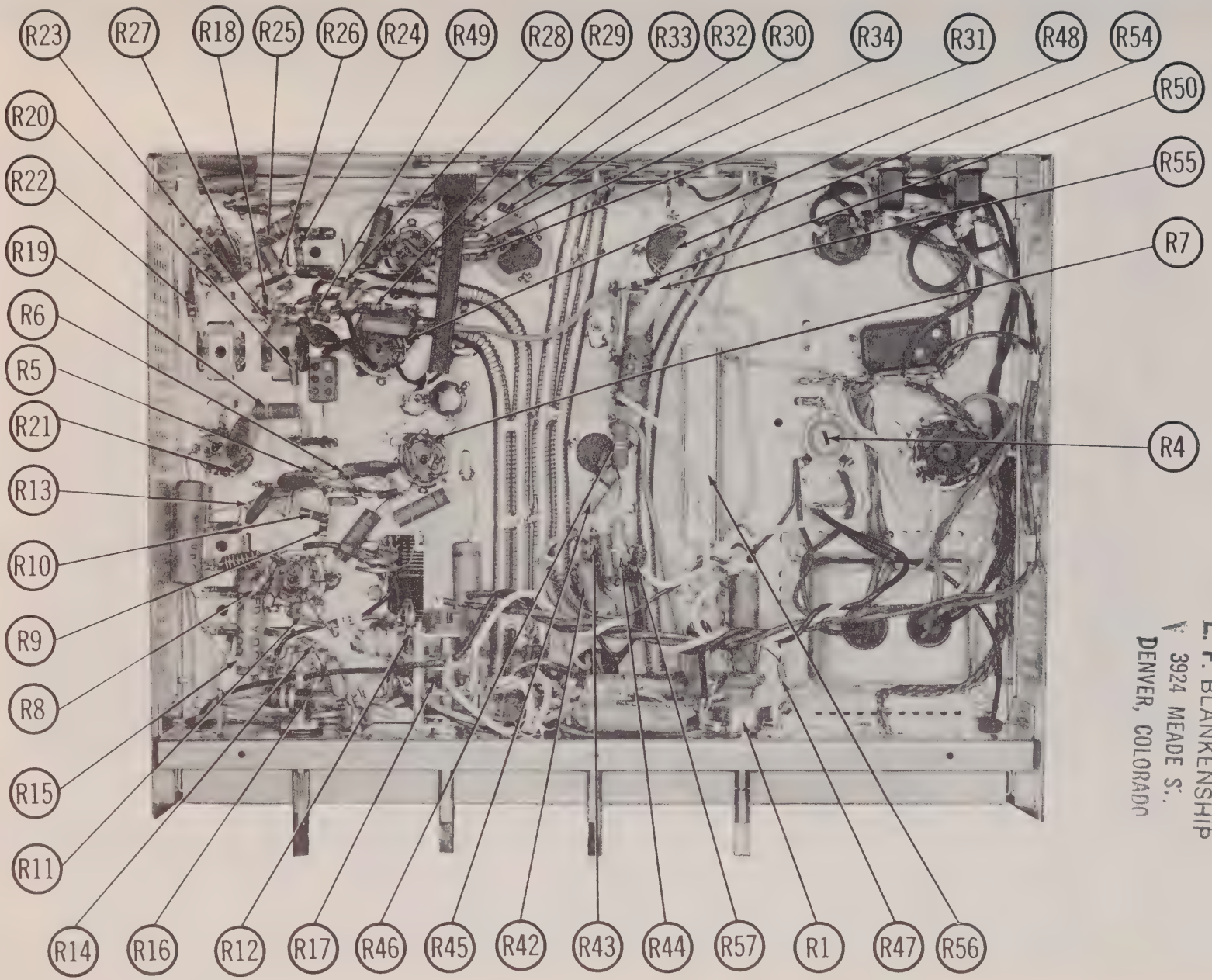


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



PROPERTY OF
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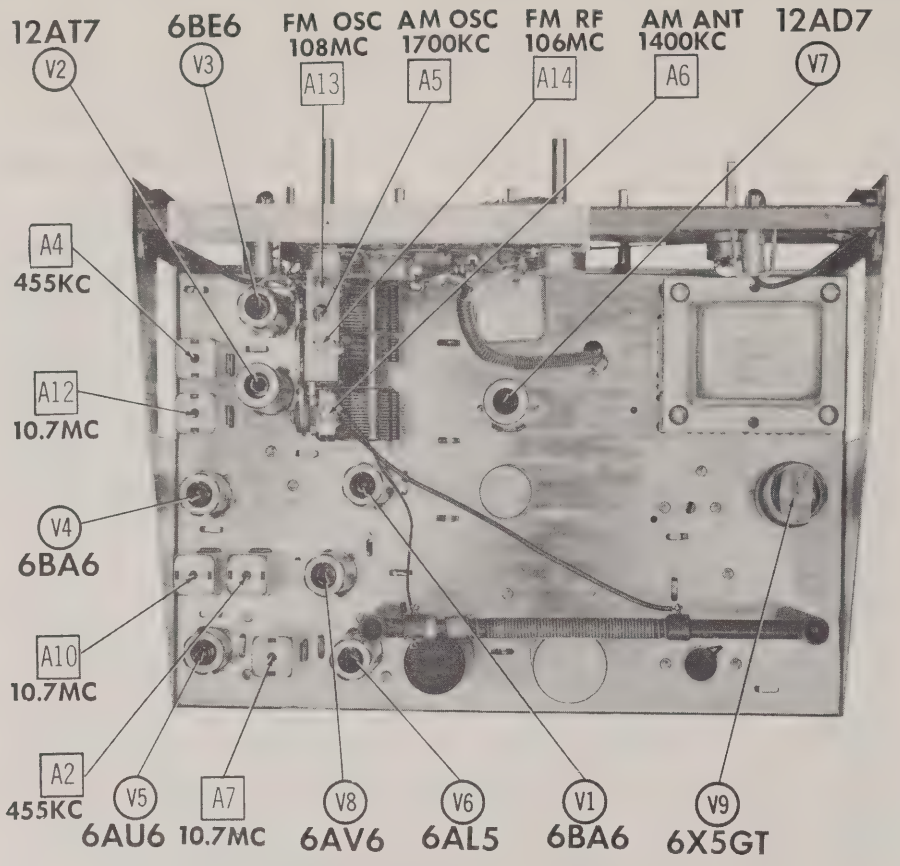
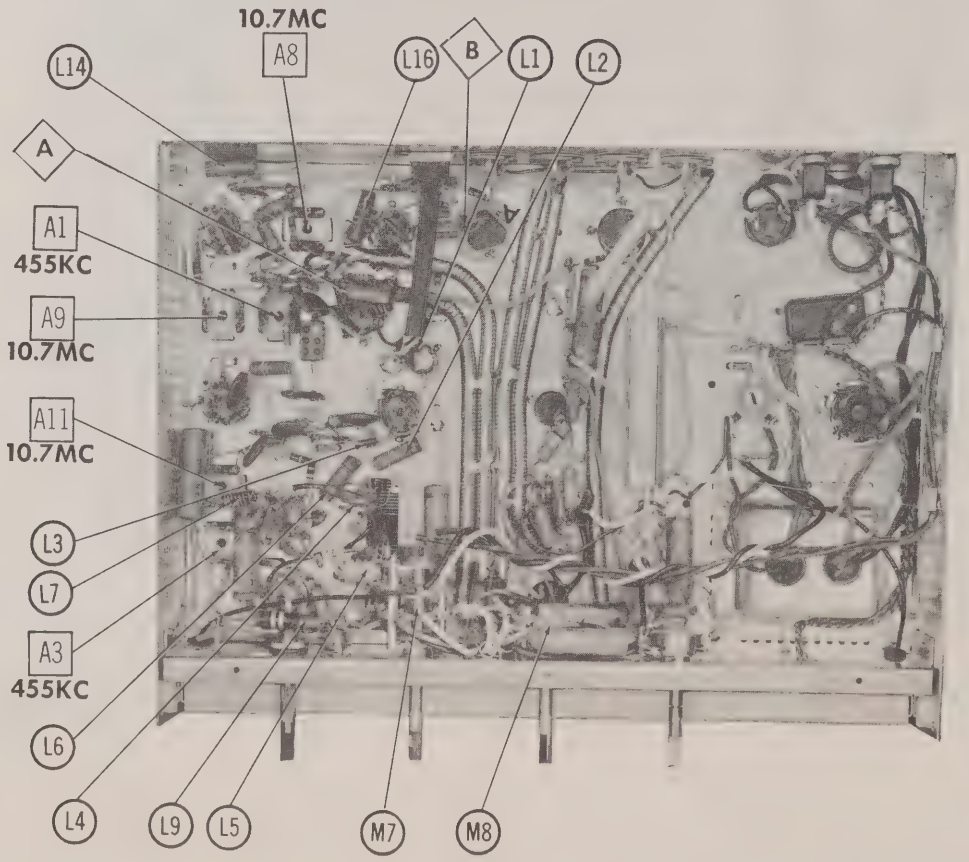
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS TOP VIEW - TUBE & ALIGNMENT IDENTIFICATION



CHASSIS BOTTOM VIEW - INDUCTOR & ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting. Bass and Treble controls to mid-range.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1	.01MFD	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	455KC (400~ Mod.)	AM	Tuning gang fully open	Connect AC VTVM across tuner output jack.	A1, A2	Adjust for maximum output
2	"	High side to pin 7 (grid) of 6BE6 (V3). Low side to chassis.	"	"	"	"	A3, A4	"
3		Loop	1700KC	"	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4		"	1400KC	"	Tune to 1400KC signal	"	A6	"

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (unmod.)	FM	Point of non-interference	DC probe to point (A). Common to chassis.	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6	"	"	"	"	"	DC probe to point (B). Common to chassis.	A8	Adjust for maximum deflection. Repeat steps 5 & 6.
7	"	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	"	"	A9, A10	Adjust for maximum deflection.
8	"	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A11, A12	"

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection. Replace V2 (12AT7) with a 12AT7 that has pin 1 (plate) clipped off.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
5	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (450KCSwp)	FM	Point of non-interference	Vert amplifier to point (A). Low side to chassis.	A7	Adjust so that 10.7MC occurs at center of crossover lines similar to Fig. 1.
6	"	"	"	"	"	Vert amplifier thru 1Meg to point (B). Low side to chassis.	A8	Disconnect stabilizing capacitor (C2). Adjust for curve of maximum amplitude and symmetry similar to Fig. 2.
7	"	High side to pin 1 (grid) of 6BA6 (V4). Low side to chassis.	"	"	"	"	A9, A10	"
8	"	High side to pin 7 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A11, A12	Reconnect stabilizing capacitor (C2). Repeat step 5. Retouch A8 for maximum amplitude and straightness of crossover lines.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9	Two 150Ω Carbon Resistors	To FM Antenna socket with 150Ω in each lead.	108MC	FM	Tune to 108MC signal	DC probe to point (B). Common to chassis.	A13	Adjust for maximum deflection.
10	"	"	106MC	"	Tune to 106MC signal	"	A14	"
11	"	"	90MC	"	Tune to 90MC signal	"	L4	Adjust for maximum deflection by compressing or expanding coil turns. Repeat step 9, 10 and 11.

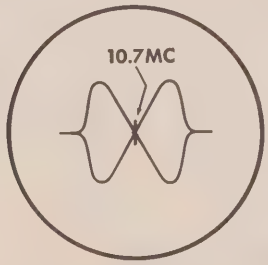


FIG. 1

FIG. 2

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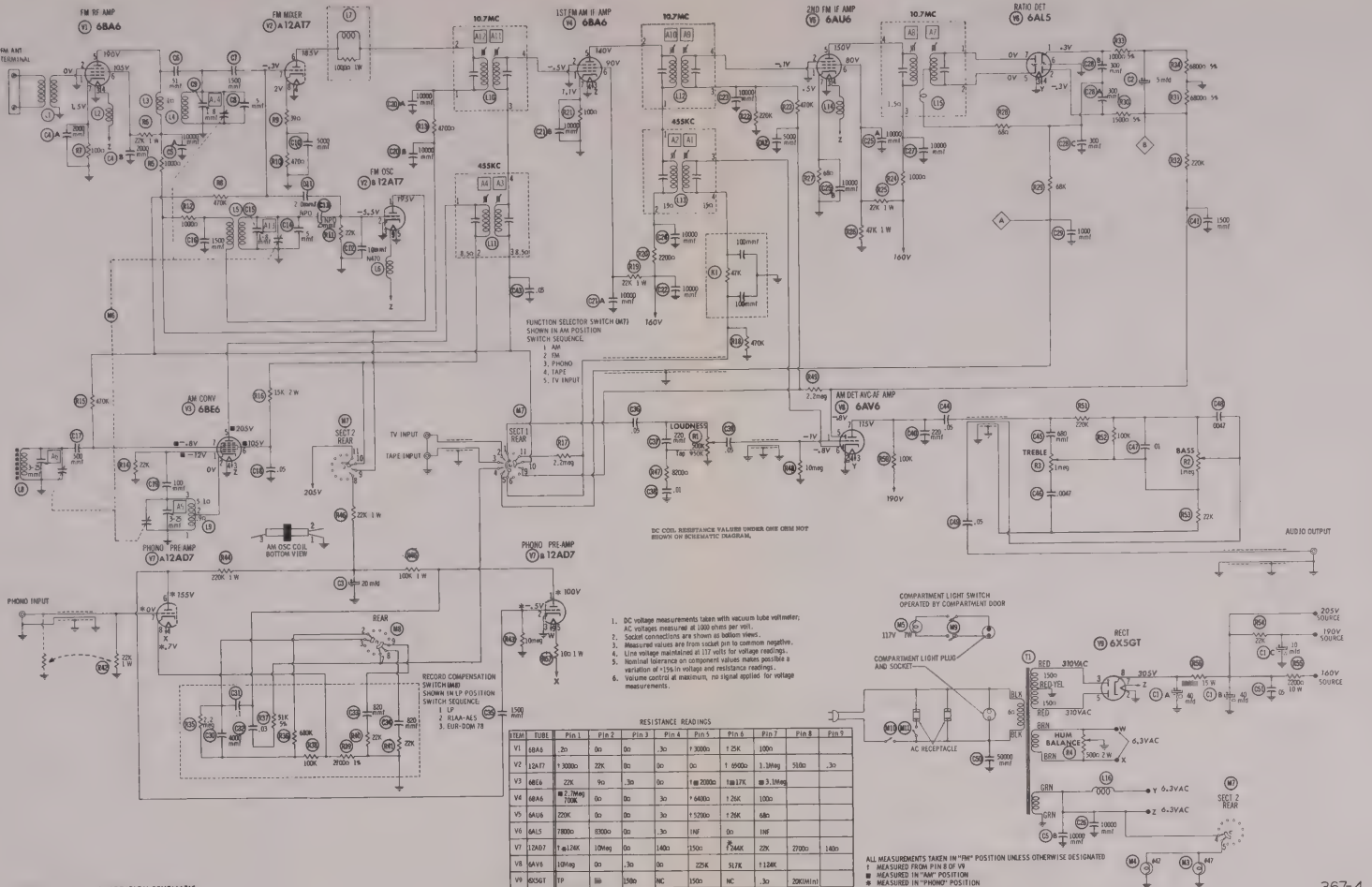

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BA6	.2Ω	0Ω	0Ω	.3Ω	↑ 3000Ω	↑ 25K	100Ω		
V2	12AT7	↑ 3000Ω	22K	0Ω	0Ω	0Ω	↑ 6500Ω	1.1Meg	510Ω	.3Ω
V3	6BE6	22K	9Ω	.3Ω	0Ω	↑ ■ 2000Ω	↑ ■ 17K	■ 3.1Meg		
V4	6BA6	■ 2.7Meg 700K	0Ω	0Ω	3Ω	* 6400Ω	↑ 26K	100Ω		
V5	6AU6	220K	0Ω	0Ω	3Ω	↑ 5200Ω	↑ 26K	68Ω		
V6	6AL5	7800Ω	8300Ω	0Ω	.3Ω	INF	0Ω	INF		
V7	12AD7	↑ ■ 1.24K	10Meg	0Ω	140Ω	150Ω	↑ 244K	22K	2700Ω	140Ω
V8	6AV6	10Meg	0Ω	.3Ω	0Ω	225K	517K	↑ 124K		
V9	6X5GT	TP	∞	150Ω	NC	150Ω	NC	.3Ω	20K(Min)	

ALL MEASUREMENTS TAKEN IN "FM" POSITION UNLESS OTHERWISE DESIGNATED
↑ MEASURED FROM PIN 8 OF V9
■ MEASURED IN "AM" POSITION
* MEASURED IN "PHONO" POSITION

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367-4

TUNER PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	FM RF Amplifier	6BA6	
V2	FM Mixer-Osc.	12AT7	
V3	AM Converter	6BE6	
V4	1st IF Amplifier	6BA6	
V5	2nd FM IF Amplifier	6AU6	

ITEM No.	USE	TYPE	NOTES
V6	Ratio Detector	6AL5	
V7	Phono Preamplifier	12AD7	
V8	AM Det. -AVC-AF Amp.	6AV6	
V9	Rectifier	6X5GT	

ELECTROLYTIC CAPACITORS

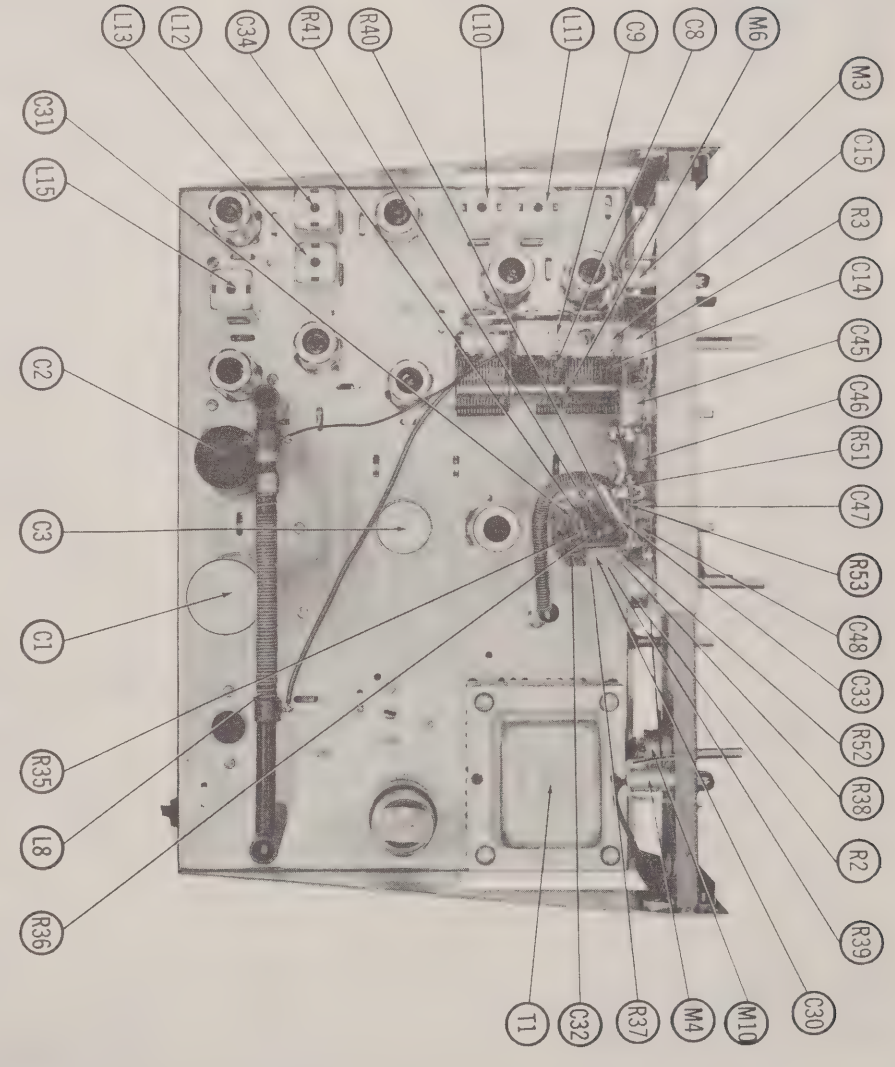
ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ANDREA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	450		AFH3-43	B0450	FP376.8	TMT-150	T-165	TVL-3785
B	▲40	450			BBR10-50				
C	▲10	50							
C2	5	250		PRS350V4	BR435	TC50X	TMS-74	S-245	TVL-1702
C3	20	450		AFH1-50	BR2045	TC75	TD-20-450	S-260	TVA-1709

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ANDREA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4A	2000			BPD-2X002	DD3-202	BYC6DD2	ED2-002	DCD522	5HK-2D2	
B	2000									
C5A	10000			BPD-2X01	DD3-103	BYD6DS1	ED-01	DC511	5HK-2S1	
B	10000						ED-01	DC511		
C6	51			SI 51	D6-500	L10Q51	GP-51	UC-545	5GA-Q5	
C7	1500			SI 1500	D6-152	LT6D15	GP-1500	UC-5215	5GA-D15	
C8	5			SI 5	D6-050	LT6V5	GP-5	ZT-555	5GA-V5	
C9	1-8						532-B			
C10	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C11	2.0					C10V2C				NP0
C12	10									N470
C13	25			NP0-SI 25	TCZ-25	C10Q25C	TC0-25	ZT-5425	5TCC-Q25	NP0
C14	5			SI 5	D6-050	LT6V5	GP-5	ZT-555		
C15	1-8						532-B			
C16	1500			SI 1500	D6-152	LT6D15	GP-1500	UC-5215	5GA-D15	
C17	500			BPD-0005	DD-501	L10T5	ED-500	UC-535	5GA-T5	
C18	.05	400		BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C19	100			1468-0001	D6-101	5W5T1	ED-100	UC-531	5GA-T1	
C20A	10000			BPD-2X01	DD3-103	BYD6DS1	ED-01	DC511	5HK-2S1	
B	10000						ED-01	DC511		
C21A	10000			BPD-2X01	DD3-103	BYD6DS1	ED-01	DC511	5HK-2S1	
B	10000						ED-01	DC511		
C22	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C23	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C24	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C25A	10000			BPD-2X01	DD3-103	BYD6DS1	ED-01	DC511	5HK-2S1	
B	10000						ED-01	DC511		
C26	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C27	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C28A	300			SI 300	D6-301	L10T3	ED-300	UC-533	5GA-T3	
B	300			SI 300	D6-301	L10T3	ED-300	UC-533	5GA-T3	
C	300			SI 300	D6-301	L10T3	ED-300	UC-533	5GA-T3	
C29	1000			1467-001	D6-102	1W5D1	ED-1000	DC521	1FM-21	
C30	4000			BPD-004	D6-402	1W5D4	ED-004	UC-524	1FM-24	
C31	.1	400		P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C32	.03	400		BPD-03	DF-303	CUB6S1		GEM-413	4TM-S3	
C33	820	500		1467-00082	D6-821	1W5D82	ED-820		1FM-382	
C34	820	500		1467-00082	D6-821	1W5D82	ED-820		1FM-382	
C35	1500			SI 1500	D6-152	LT6D15	GP-1500	UC-5215	5GA-D15	
C36	.05	200		BPD-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C37	220	500		1468-00022	D6-221	5W5T22	ED-220	UC-5322	1FM-322	
C38	.01	400		BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C39	.05	200		BPD-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C40	220	500		1468-00022	D6-221	5W5T22	ED-220	UC-5322	1FM-322	
C41	1500			SI 1500	D6-152	LT6D15	GP-1500	UC-5215	5GA-D15	
C42	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA ANDREA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C43	.05	200		BPD-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C44	. 05	400		BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	
C45	680	500		1467-00068	D6-681	1W5T68	ED-680	UC-5368	1FM-368	
C46	. 0047	400		BPD-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C47	. 01	400		BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C48	. 0047	400		BPD-0047	D6-472	CUB6D47	GP-4700	GEM-6247	6TM-D47	
C49	.05	200		BPD-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C50	50000	500		BPD-05	DF-503	CUB6S5		GEM-615	6TM-S5	
C51	.05	400		BPD-05	DF-503	CUB4S5		GEM-415	4TM-S5	

CONTROLS

ITEM No.	RATING RESIST-ANCE	RATING WATTS	REPLACEMENT DATA ANDREA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	500K	½		BT-63	A47F4-500K	Q18-133X	UT-429	Loudness, Tap @ 50K
B	Shaft			Not req.	FS-3	Not req.	Not req.	
R2A	1Meg	½		B-60	A47-1Meg-Z	Q13-137	U53	Bass
B	Shaft			Not req.	FS-3	Not req.	Not req.	
R3A	1Meg	½		B-68		Q17-137	U52	Treble
B	Shaft			Not req.		Not req.	Not req.	
R4	500Ω	2						Hum Balance (Wire wound)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ANDREA PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R5	1000Ω			BTS-1000	
R6	22K	1		BTA-22K	
R7	100Ω			BTS-100	
R8	470K			BTS-470K	
R9	39Ω			BTS-39	
R10	470Ω			BTS-470	
R11	22K			BTS-22K	
R12	1000Ω			BTS-1000	
R13	4700Ω			BTS-4700	
R14	22K			BTS-22K	
R15	470K			BTS-470K	
R16	15K	2		BTB-15K	
R17	2. 2Meg			BTS-2. 2Meg	
R18	470K			BTS-470K	
R19	22K	1		BTA-22K	
R20	2200Ω			BTS-2200	
R21	100Ω			BTS-100	
R22	220K			BTS-220K	
R23	470K			BTS-470K	
R24	1000Ω			BTS-1000	
R25	22K	1		BTA-22K	
R26	47K	1		BTA-47K	
R27	68Ω			BTS-68	
R28	68Ω			BTS-68	
R29	68K			BTS-68K	
R30	1500Ω 5%			BTS-1500 5%	
R31	6800Ω 5%			BTS-6800 5%	

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ANDREA PART No.	REPLACEMENT DATA IRC PART No.	NOTES
R32	220K			BTS-220K	
R33	1000Ω 5%			BTS-1000 5%	
R34	6800Ω 5%			BTS-6800 5%	
R35	2. 2Meg			BTS-2. 2Meg	
R36	680K			BTS-680K	
R37	51K 5%			BTS-51K 5%	
R38	100K			BTS-100K	
R39	2700Ω 1%			DCC-2700 1%	
R40	22K			BTS-22K	
R41	22K			BTS-22K	
R42	22K	1		BTA-22K	
R43	10Meg			BTS-10Meg	
R44	220K	1		BTA-220K	
R45	100K	1		BTA-100K	
R46	22K	1		BTA-100K	
R47	8200Ω			BTS-8200	
R48	10Meg			BTS-10Meg	
R49	2. 2Meg			BTS-2. 2Meg	
R50	100K			BTS-100K	
R51	220K			BTS-220K	
R52	100K			BTS-100K	
R53	22K			BTS-22K	
R54	22K			BTS-22K	
R55	2200Ω	10		2D-2000	
R56	2000Ω	15			
R57	10Ω	1		BTA-10	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA ANDREA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC @ .43A	590VCT @ .040A	6.3VAC @ 2. 8A	6.3VAC @ .35A	EP-118-P					

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA ANDREA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	FM Ant. Coupling Trans.					
L2	Fil. Choke		19-1001	BC-562	4604	1. 5 Microhenries
L3	RF Choke					3 Microhenries
L4	FM RF Coil					
L5	FM Osc. Coil					
L6	Fil. Choke		19-1001	BC-562	4604	1. 5 Microhenries
L7	RF Choke				4582 *	.15 Microhenry, wound on 1000Ω resistor
L8	Loop Stick			BC-418		
L9	AM Osc. Coil			BC-393	70-OSC (11)	Drill mounting hole
L10	1st. FM IF		16-3487	FM-254	1463	
L11	1st. AM IF		16-6758	BC-352	12-C1	
L12	2nd. FM IF		16-3487	FM-254	1463	
L13	2nd. AM IF		16-6758	BC-353	12-C2	
L14	Fil. Choke		19-1001	BC-562	4604	1. 5 Microhenries
L15	Ratio Det.		17-3498	FM-255	1465	
L16	Fil. Choke		19-1001	BC-562	4604	1. 5 Microhenries

* Parallel with 1000Ω resistor.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	ANDREA PART No.	REPLACEMENT DATA
K1	Det-RF-Filter	100MMF, 100MMF, 47K		Aerovox PA-97-1 Centralab PC-50 Cornell-Dubilier 111TM1 Erie 1403-01 Sprague D-1

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA ANDREA PART No.	ASTATIC PART No. CARTRIDGE	ASTATIC PART No. NEEDLE	ELECTRO-VOICE PART No. CARTRIDGE	ELECTRO-VOICE PART No. MOUNT	REMARKS
M1	FM-5437					

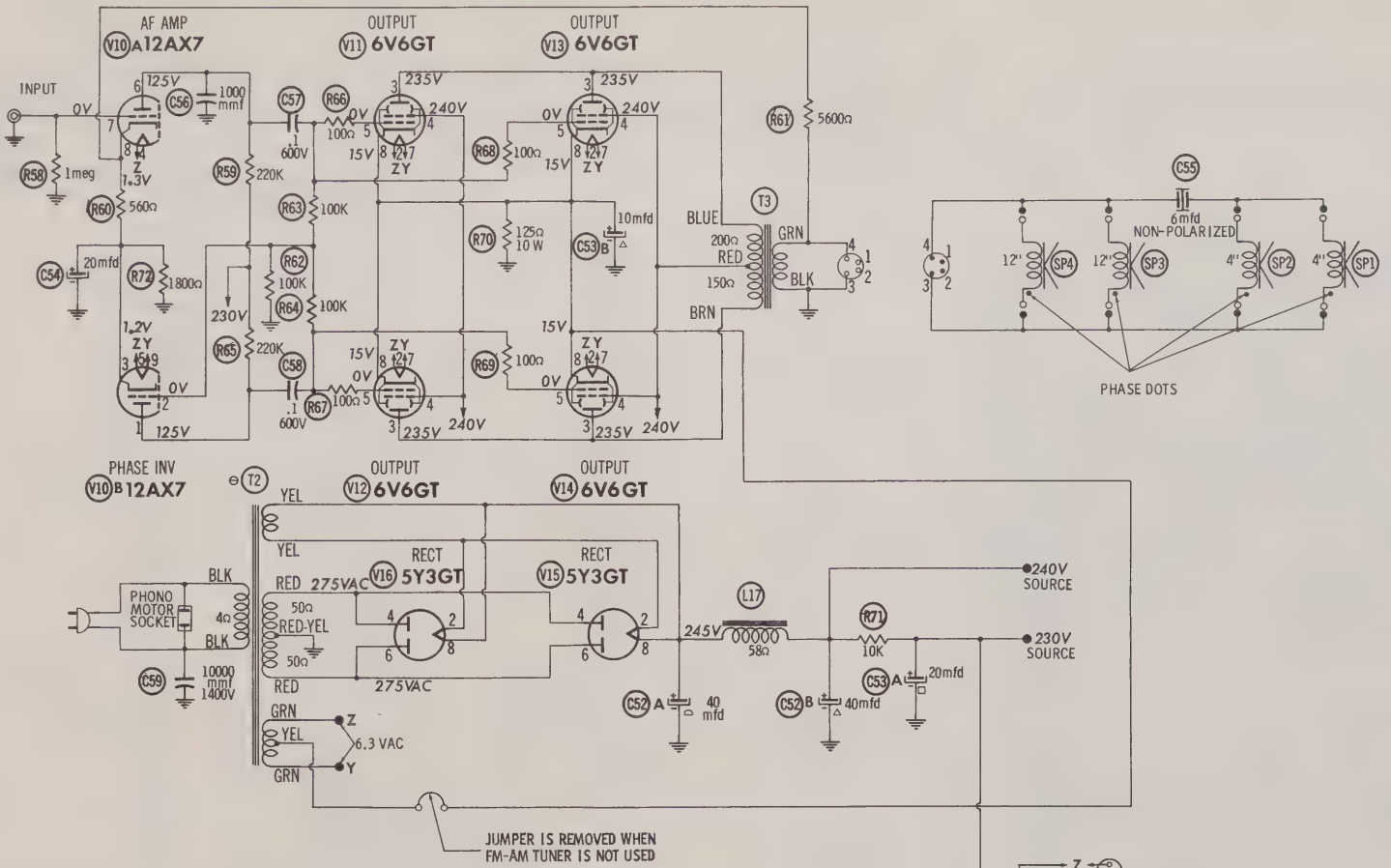
PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA ANDREA PART No.	JENSEN PART No.	WALCO PART No.	REMARKS
M2		† G-1 or ♦ G-1D	† W-68MGS or ♦ W-68MGD	† Jewel ♦ Diamond
		† G-3 or ♦ G-3D	† W-68S or ♦ W-68D	

MISCELLANEOUS

ITEM No.	PART NAME	ANDREA PART No.	NOTES
M3	Dial Light		#47
M4	Dial Light		#47
M5	Lamp		117-125V-7W
M6	Tuning Cap.		5 Gang (AM Ant. 35-515MMF, AM Osc. 22-155MMF)
M7	Switch		Function Selector (Rotary Wafer Type)
M8	Switch		Record Compensator (Rotary Wafer Type)
M9	Switch		Compartment Door Light (ON-OFF)
M10	Switch		ON-OFF
M11	Switch		ON-OFF (AC Receptacle)



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V10	12AX7	† 230K	100K	1800Ω	130Ω	130Ω	† 230K	1Meg	2350Ω	130Ω
V11	6V6GT	NC	130Ω	† 260Ω	† 58Ω	200K	TP	130Ω	125Ω	
V12	6V6GT	NC	130Ω	† 210Ω	† 58Ω	200K	NC	130Ω	125Ω	
V13	6V6GT	TP	130Ω	† 260Ω	† 58Ω	200K	TP	130Ω	125Ω	
V14	6V6GT	NC	130Ω	† 210Ω	† 58Ω	200K	NC	130Ω	125Ω	
V15	5Y3GT	NC	20K(Min)	NC	50Ω	NC	50Ω	NC	20K(Min)	
V16	5Y3GT	NC	20K(Min)	NC	50Ω	NC	50Ω	NC	20K(Min)	

† MEASURED FROM PIN 8 OF V15 OR 16
TP TIE POINT
NC NO CONNECTION

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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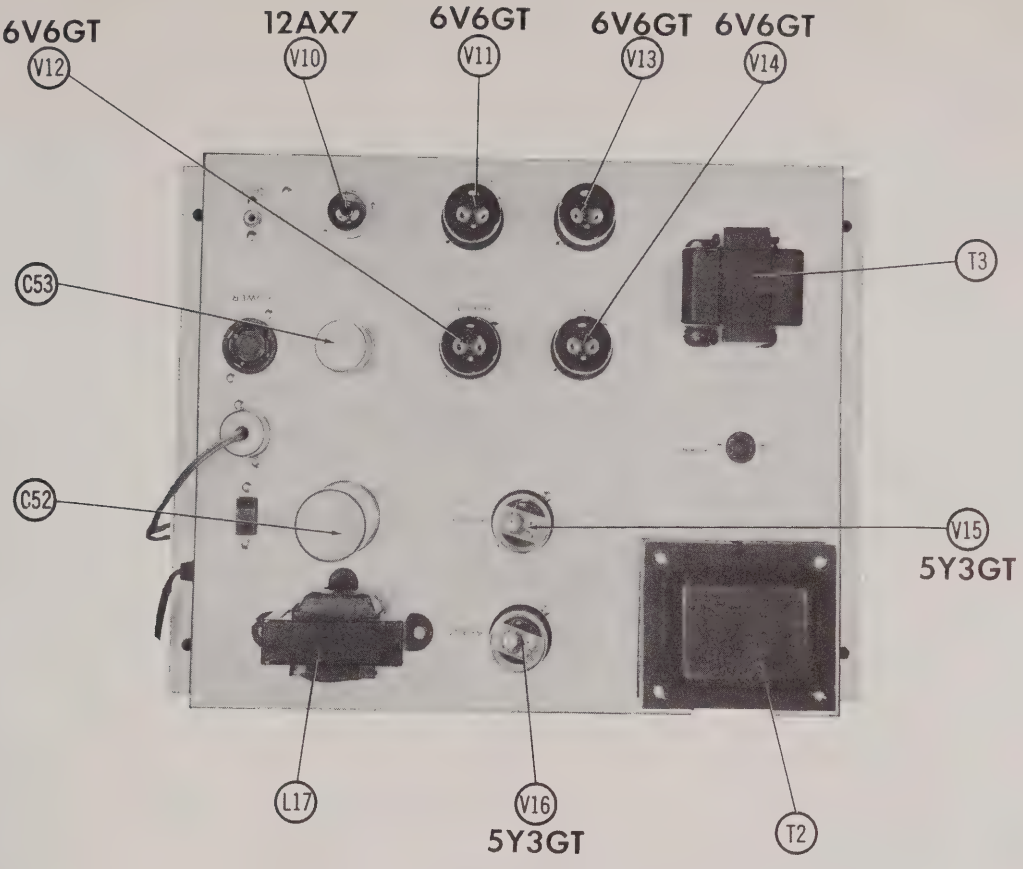
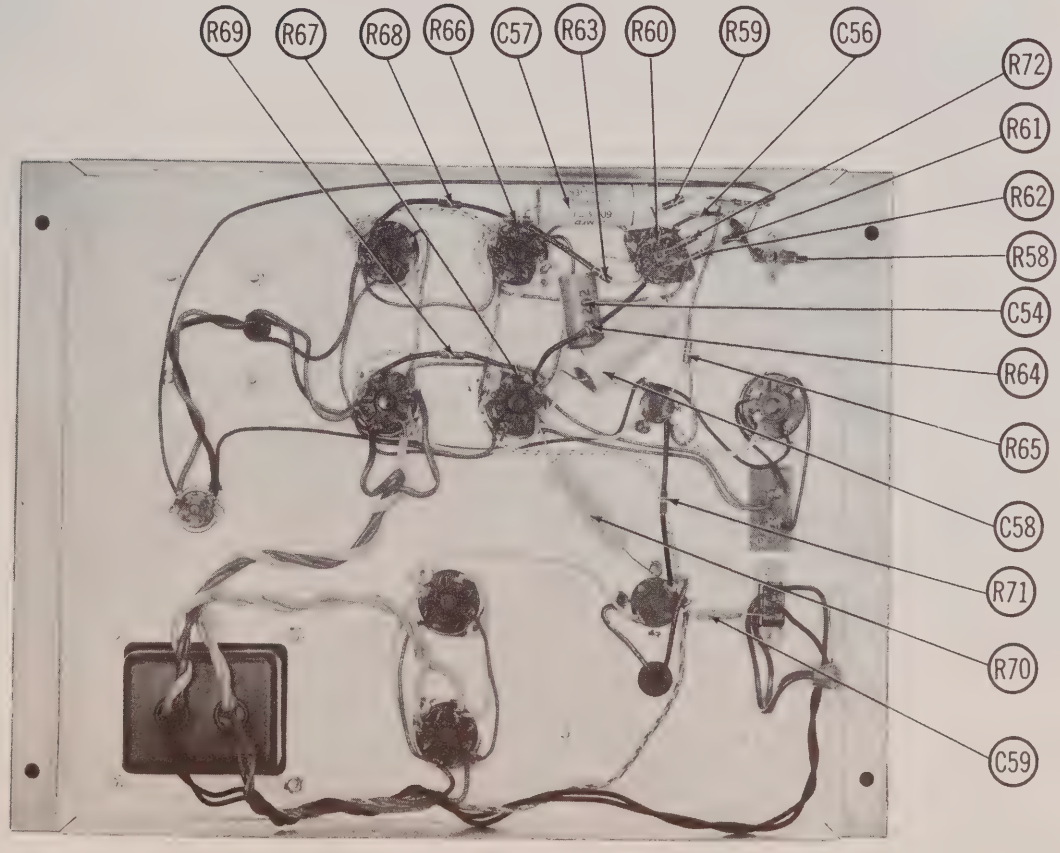


AMP. CHASSIS - TOP VIEW



AMP. CHASSIS - BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V10	AF Amp-Phase Inverter	12AX7	
V11	Output	6V6GT	
V12	Output	6V6GT	
V13	Output	6V6GT	
V14	Output	6V6GT	
V15	Rectifier	5Y3GT	
V16	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	ANDREA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C52A	▲40	450	HCE-1340	AFH2-57	B0450	FP238	TMD-54	D-235	TVL-2764
B	▲40	450							
C53A	■20	450	HCE-1324	AFH2-50	B0640	FP144	TMS-55	S-260	TVL-2702
B	▲10	25				TC22	TD-10-25	FM-0210	
C54	20	25	HCE-1347	PRS50V20	BBR20-25	TC45	TD-20-150	FM-1520	TVA-1410
C55	6	10VAC	HCE-1343	PRS10VAC8	BR1615 †	TC108		MT-1512	R2235 *
					BR1615 †			MT-1512 †	

† Connect negative leads together
* Non catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	ANDREA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C56	1000		HCC-1956	BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C57	.1	600	HCT-1002	P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1	
C58	.1	600	HCT-1002	P688N-1	DF-104	CUB6P1		GEM-601	6TM-P1	
C59	10000	1400	HCC-1963	P1688N-01	DD16-103	CUB16S1		GEM-1611	MB-S1	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ANDREA PART No.	IRC PART No.	
R58	1Meg		GRC-274	BTS-1Meg	
R59	220K		GRC-270	BTS-220K	
R60	560Ω		GRC-250	BTS-560	
R61	5600Ω		GRC-248	BTS-5600	
R62	100K		GRC-258	BTS-100K	
R63	100K		GRC-258	BTS-100K	
R64	100K		GRC-258	BTS-100K	
R65	220K		GRC-270	BTS-220K	
R66	100Ω		GRC-216	BTS-100	
R67	100Ω		GRC-216	BTS-100	
R68	100Ω		GRC-216	BTS-100	
R69	100Ω		GRC-216	BTS-100	
R70	125Ω	10	GRW-552	1 3/4 A-125	
R71	10K		GRC-304	BTS-10K	
R72	1800Ω		GRC-346	BTS-1800	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	ANDREA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T2	117VAC	527VCT	5VAC	6.3VCT	ST-3074 ①					
	ⓖ .8A	ⓖ .135A	ⓖ 4A	ⓖ 2.5A	ST-3081 ②					

① 60% Operation
② 50% Operation

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	ANDREA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T3	4000Ω CT	3-4Ω	ST-3077				22S95 ①		① Drill new mounting holes.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	ANDREA PART No.	QUAM PART No.	
SP1	4"	PM	6-8Ω	SL-4032 ①	4A15TZ6.4 ①	① Connect in parallel & phase.
SP2	4"	PM	6-8Ω	SL-4032 ①	4A15TZ6.4 ①	
SP3	12"	PM	6-8Ω	SL-4028 ①	12A10 ①	
SP4	12"	PM	6-8Ω	SL-4029 ①	12A10 ①	

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	ANDREA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L17	.135A	58Ω	3Hy.	ST-3078	C5026 ①	C-2991	C-2325	20C64	C-21X

① Drill one new mounting hole.

MISCELLANEOUS

ITEM No.	PART NAME	ANDREA PART No.	NOTES
M12	Pilot Light		#47

BELL SOUND
MODEL RT-204

BELL SOUND
MODEL RT-204

GENERAL INFORMATION

The Bell Model RT-204 is designed to record and play back two tracks of material on standard width recording tape (1/4"), which doubles the playing time of a standard 5" or 7" reel of tape with no loss of frequency response or quality. Recordings can be made from a radio, television receiver or phonograph, in addition to those made directly from the microphone. Recordings can be played back through the self-contained speaker or external speaker through use of the External Speaker Jack.

The Bell Model RT-204 has two tape speeds, 7 1/2" and 3 3/4" per second. Using both tracks, the recording time is as followed:

Size Reel	3 3/4" Speed	7 1/2" Speed
5" (600 ft.)	1 hour	1/2 hour
7" (1200 ft.)	2 hours	1 hour

The Bell Model RT-204 is designed to operate on 60 cycle, 110-120 volts, AC supply only.

Manufactured by:

BELL SOUND SYSTEMS, INC.
A SUBSIDIARY OF THOMPSON PRODUCTS, INC.
555 MARION ROAD
COLUMBUS, OHIO

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

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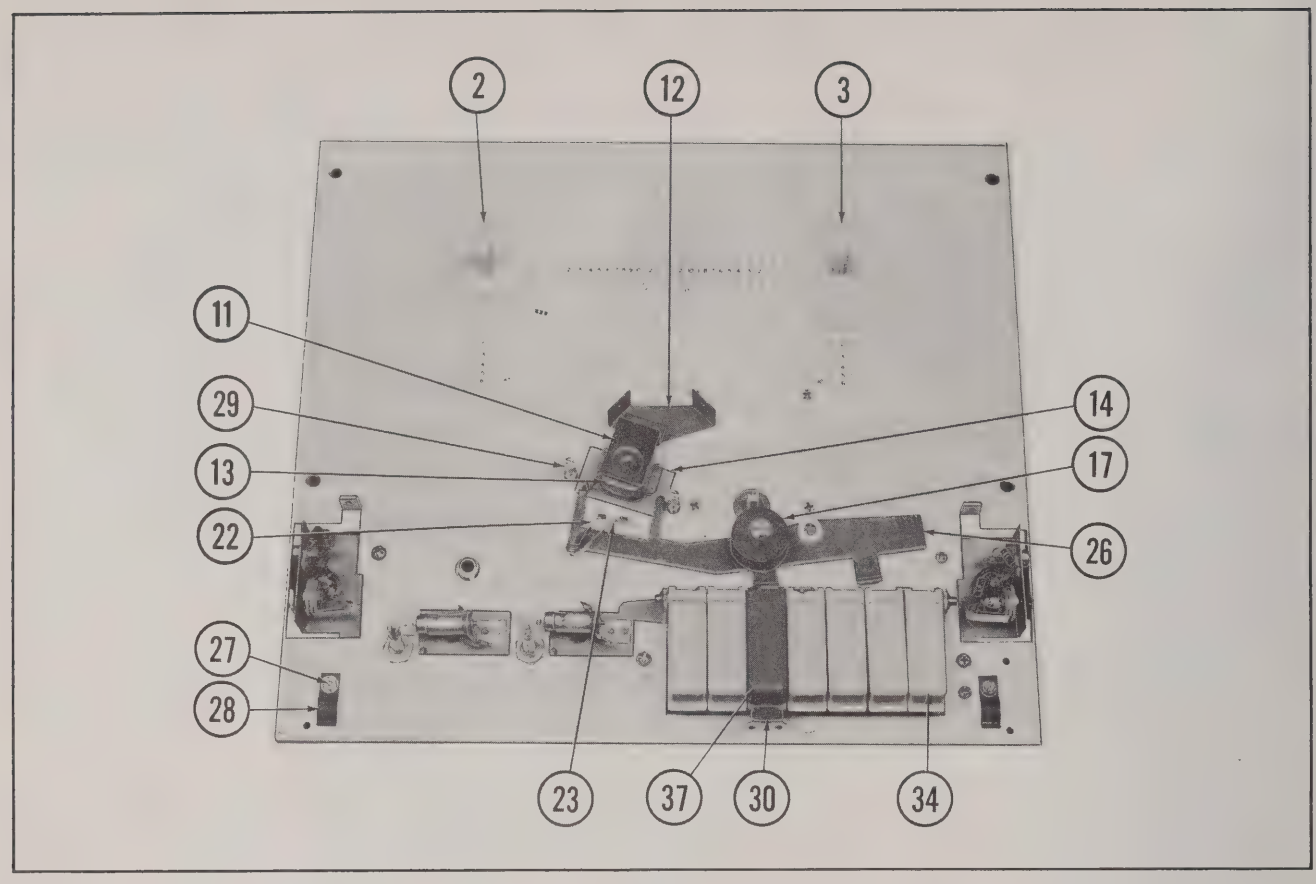

FIGURE 1

GENERAL DESCRIPTION

The Bell Model RT-204 is a dual track tape recorder having seven piano-type keys for controlling tape speed, record, play, rewind, forward, and stop modes.

This Bell Tape Recorder has been designed to eliminate adjustments which may cause a problem in the use and servicing of this machine. Three motors are used, rewind, capstan, and takeup. As a result, moving parts on the transport mechanism have been held to a minimum.

Two output jacks permit use of an external speaker or high fidelity amplifier system. When the speaker jack is used, the self-contained speaker is automatically disconnected.

Recordings may be monitored through high or low impedance headphones, external speaker, or an external amplifier.

Built in interlocks prevent the operator from placing the machine in more than one mode at a time. The "Stop" key must be depressed before going from one mode to another, except when changing speed. This prevents tape breakage, spillage, and accidental erasure.

A removable cover plate on the bottom of the cabinet allows easy access to tubes, motors, and hum adjustment.

Model RT-204 is designed to operate on 60 cycle, 110-120 volts, AC supply only. Severe Damage Will Result If Connection Is Made To A Direct Current (DC) LINE.

SPECIFICATIONS

Frequency Response: 30 to 10,000 cycles at 7 1/2 inches per second.

Speeds (two): Play or record. 7 1/2 or 3 3/4 inches per second.

Fast Forward: 5" reel — 25 ±2 second.
7" reel — 45 ±5 second.

Fast Rewind: 5" reel — 25 ±2 second.
7" reel — 45 ±5 second.

Wow and Flutter: Less than .3% at 7 1/2 I.P.S.
Less than .5% at 3 3/4 I.P.S.

Preparing For Operation —

1. Open and remove the lid by sliding it to the right of the hinges. Place the recorder on a hard flat surface so that the feet will allow air to enter the bottom grille for ventilation.

2. Insert the AC power cord plug into a convenient 110-120 volt, 60 cycle AC outlet.

Threading The Tape —

Place a reel of "A" wind tape (glossy side out) on the supply reel platform (2). Turn the reel while pressing down lightly so that the three slots in the reel hub engage the three keys on the reel platform. Place an empty reel on the take-up reel platform (3) and draw the end of the tape across and into the hub of the empty reel. Insert the end of the tape into one of the slots in the hub of the empty reel and rotate reel counter clockwise until tape is secured to hub. Drop the tape into the tape slot and take up slack in tape before turning unit on.

NOTE: This machine will operate in either a horizontal or vertical position. When operating with the front panel in a vertical position, use the two rubber reel spindle tips to hold the reels firmly on the spindles. Remove these (pull off) when loading tape on machine.

To Record From Microphone —

Depress the "Stop" key, then turn on the recorder by rotating the "Tone" control clockwise. Depress the desired speed key and allow approximately 30 seconds for the unit to warm up. Insert the microphone plug into the Mic. jack. Next, pull the record lock (30) toward the front of the case and depress the red record key. The tape will move and all sounds striking the microphone will be recorded on the tape if the "Volume" control is turned up sufficiently. The correct volume control setting is that which causes the record level lamp (located under the "Volume" control knob) to flash on peak sounds. If the lamp fails to light, volume is too low. If the lamp flashes constantly, volume is too high. The "Volume" control should be set from 1/2 to 3/4 of maximum.

To Record From Radio, Phono or TV —

The most satisfactory method is to connect the "Radio" input of the recorder to the radio or TV voice coil terminals.

In the case of an AM-FM Tuner, connect to the tuner output where there are no tone controls in the circuit. If this is not feasible, be sure tone controls are in a flat position. Also, cut out any loudness controls since these accentuate bass and treble frequencies.

To record from a phonograph equipped with a crystal cartridge, connect the cartridge directly into the "Radio" input on the recorder. When using a magnetic cartridge, connect a preamp between the cartridge and "Radio" input on the recorder.

After the proper connections are made, proceed with the recording as described under "To Record From Microphone".

NOTE: In order to obtain the best recording quality, volume control on the RT-204 should be at a 50% setting or above when the record level lamp flashes on peak sounds. If the volume control, when recording, must be turned down to a low setting (say 1/4 of the way up or 25%) to obtain proper flashing of the lamp, it means that the signal being fed into the recorder is too high. To avoid possible distortion, place the microphone farther away from the source, or turn down the volume of the radio or phonograph so that the RT-204 volume control can be advanced to 50% or higher for proper recording level.

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DENVER, COLORADO

Dual Track Operation —

When recording has used up the full tape length, except for a few turns on the supply reel (left hand side), turn reels over and exchange end for end placing the now full reel on the supply platform and the now empty reel (except for a few turns) on the take-up platform. Proceed with the recording as described under "To Record From Microphone".

Either track may be played back at any time by turning the reels over and exchanging platforms.

To Rewind —

After recording is made, press the "Stop" key all the way down, then depress the "Rewind" key. When desired portion of tape is rewound, push down "Stop" key. Wait for the tape to stop before pressing the "Play" key.

To Play a Recording —

1. To play back a tape recorded on the RT-204 or to play a commercial pre-recorded tape, install reels on platforms and thread as for recording. Turn unit "On", select proper speed, and depress "Play" key. Adjust "Volume" and "Tone" controls for desired listening level. After playing, depress the "Stop" key.

2. To play back second track, turn reels over and place on opposite reel platforms. This may be done at any time during playback.

To Use External Speaker —

Recordings may be played back through an external speaker by inserting a phone plug in the speaker jack. This jack when used, disconnects the built-in speaker.

To Use External Amplifier —

Recordings may be played back through a Hi-Fi system by connecting to the "Ampl." output jack. To silence internal speaker while in "Play" position, insert a phone plug, miniature type, into the "Spkr." output

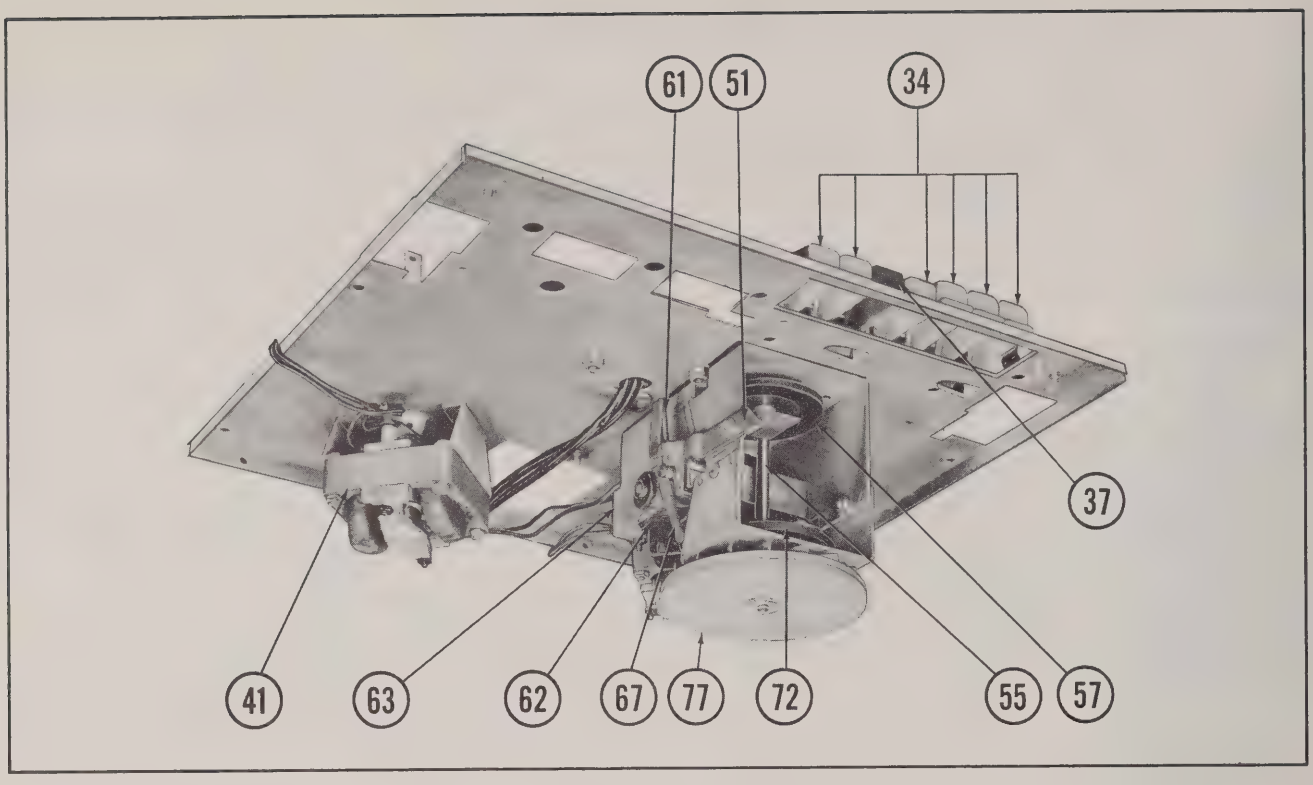


FIGURE 2

jack. For best results, the phone plug should be terminated in a 6 ohm resistor.

Fast Forward –

In playback, it is sometimes desirable to skip portions of tape to a particular spot. To do this, push down "Forward" key until tape arrives at desired spot; then depress "Stop" key. Be sure keys are pressed all the way down. Wait for the tape to stop before pressing the "Play" key.

To Monitor Recordings –

Any signal being recorded may be monitored by plugging high or low impedance phones into the "Spkr." output jack.

An external amplifier may be used to monitor any signals being recorded if connected to the "Amp." jack. An external speaker may also be used. Use "Spkr." output jack.

DISASSEMBLY INSTRUCTIONS

To Remove Recorder From Cabinet –

Remove the four Phillips-head screws located at the edges of the top deck plate and lift the unit straight up from the case. Disconnect speaker leads from speaker before lifting unit completely out of case.

ADJUSTMENTS

Head And Pressure Pad Adjustments –

To properly check head azimuth alignment it is necessary to have a pre-recorded 1 mil alighment tape which results in a 7500 cycle per second signal when operated at 7 1/2 inches per second. Play alignment tape back through recorder with an AC VTVM connected across the speaker or 6Ω load.

CAUTION: Be sure recorder is in "Play" position to prevent erasure of alignment tape.

Three things can cause low meter readings (providing amplifier and tubes are working properly). These are, dirty head, improper pressure pad pressure, or wrong head alignment angle. Check these things as follows:

1. Check head to be sure there is no dirt on the pole pieces or bakelite portion. Dirt holds the tape away from the pole pieces and lowers output. If head is dirty, clean with head cleaning solvent or alcohol. Wipe dry immediately after cleaning.

2. Check that pressure pads (22 and 23) cover the head pole faces. The pressure at the spring side of the play-record pad (23) should be 30 grams and the pressure at the spring side of erase pad (22) should be 20 grams. Bend pad springs only when necessary, avoiding odd-appearing kinks in the springs.

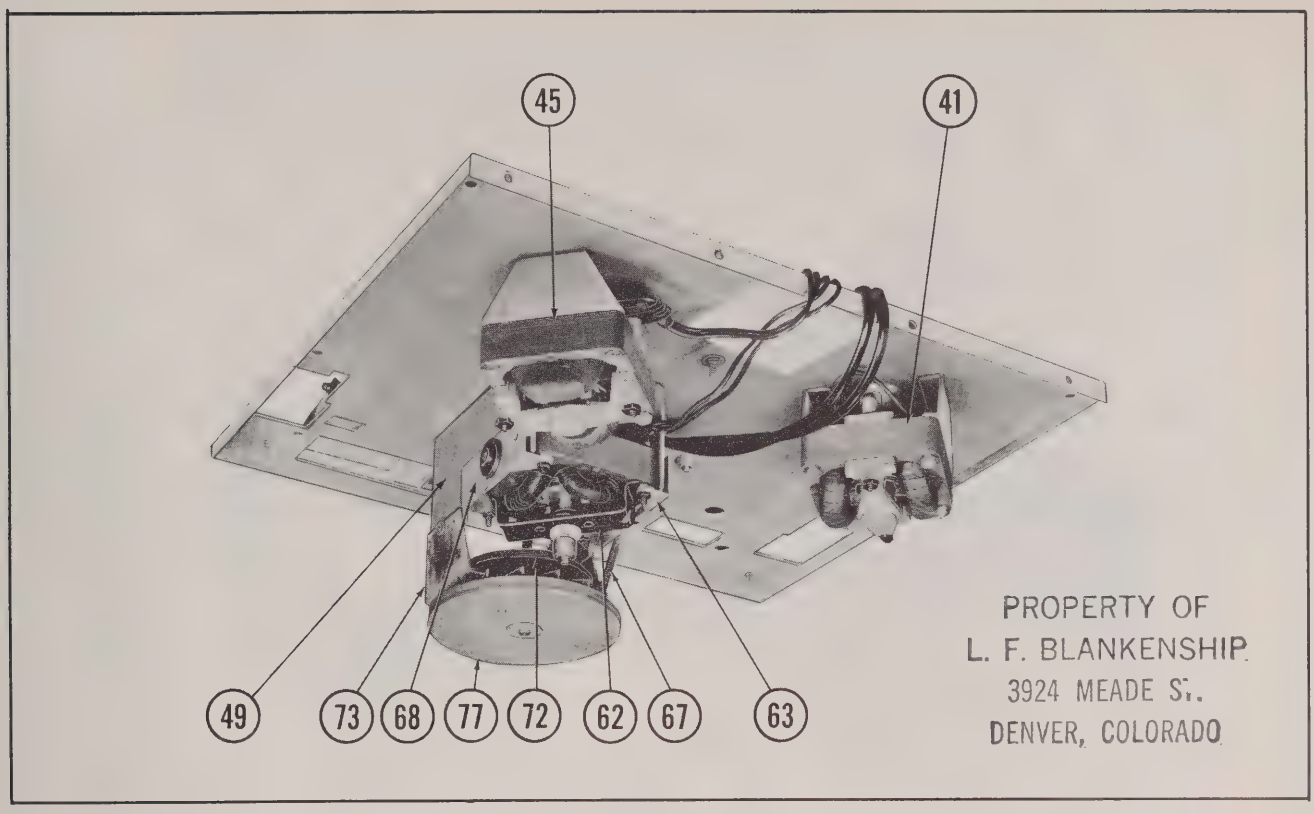


FIGURE 3

3. To adjust head alignment by means of tape guide heights without destroying the correct nominal tape height at the head, proceed as follows:

Set both left and right tape guides (29) to .486". (at top surface) off of panel. With head fully seated, run the 7500 cycle alignment tape through the machine with the "Volume" and "Tone" controls full on. Adjust the left tape guide by rotating not more than plus or minus 1/2 turn (±.016"). If this fails to produce a peak voltage reading on the AC vacuum tube voltmeter, adjust the right tape guide by not more than ±1/4 turn (±.008"). This amount of adjustment will tilt the tape by more than the normal head mis-alignment and if no peak is reached either the head is not fully seated or the head mounting plate (14) is bent, or the head itself is worn. Tape position must be such that, when playing back a tape having the opposite track recorded to normal level no crosstalk will be audible in the play-back (slight crosstalk may be audible in ideal listening conditions).

Reel Platform Adjustment —

The reel platforms (2 and 3) must clear the deck plate by 1/32" minimum — 1/16" maximum and both reel platforms must be the same height on a given machine. Adjustment is made by loosening set screw (4) and positioning reel platform (2) or (3) to the correct height. After adjustment is made, tighten set screw (4).

Hum Adjustments —

Measure hum output voltage across 6Ω load, "Volume" control maximum and "Tone" control minimum.

The hum balance control (R3) on the amplifier should be adjusted first for minimum amplifier hum but will probably have to be slightly re-adjusted for lowest overall hum, i.e., the hum voltage will help cancel hum induction into the head from the power transformer and motors. Minimum hum voltage in playback is obtained by correctly polarizing the power transformer and motors, correctly polarizing the line cord plug, adjusting the hum balance pot for minimum hum, and selecting the pre-amp tube (V1) if necessary.

Procedure for Motor Phasing — in "Play" Position But Without Tape.

1. With all motors disconnected and the head shorted, the amplifier should have only a 10 to 15 mv hum output. With the head connected, hum is from the power transformer and should be under 50 mv. This can be reduced by shimming the transformer mounting spacers to tilt the transformer (only necessary in extreme cases).

2. Plug in the take-up motor (45) in the direction giving lowest hum. Check hum balance control (R3).

3. Plug in capstan motor (62) in the direction giving lowest hum — do not change take-up motor connections. Check hum balance control (R3). Brown wire on common should be minimum.

4. Plug in rewind motor (41) in the direction giving lowest hum. This motor will introduce 120 cycle hum which will not be helped by the hum balance control, however it sometimes affects hum balance slightly and the hum control should be adjusted after this last motor is connected.

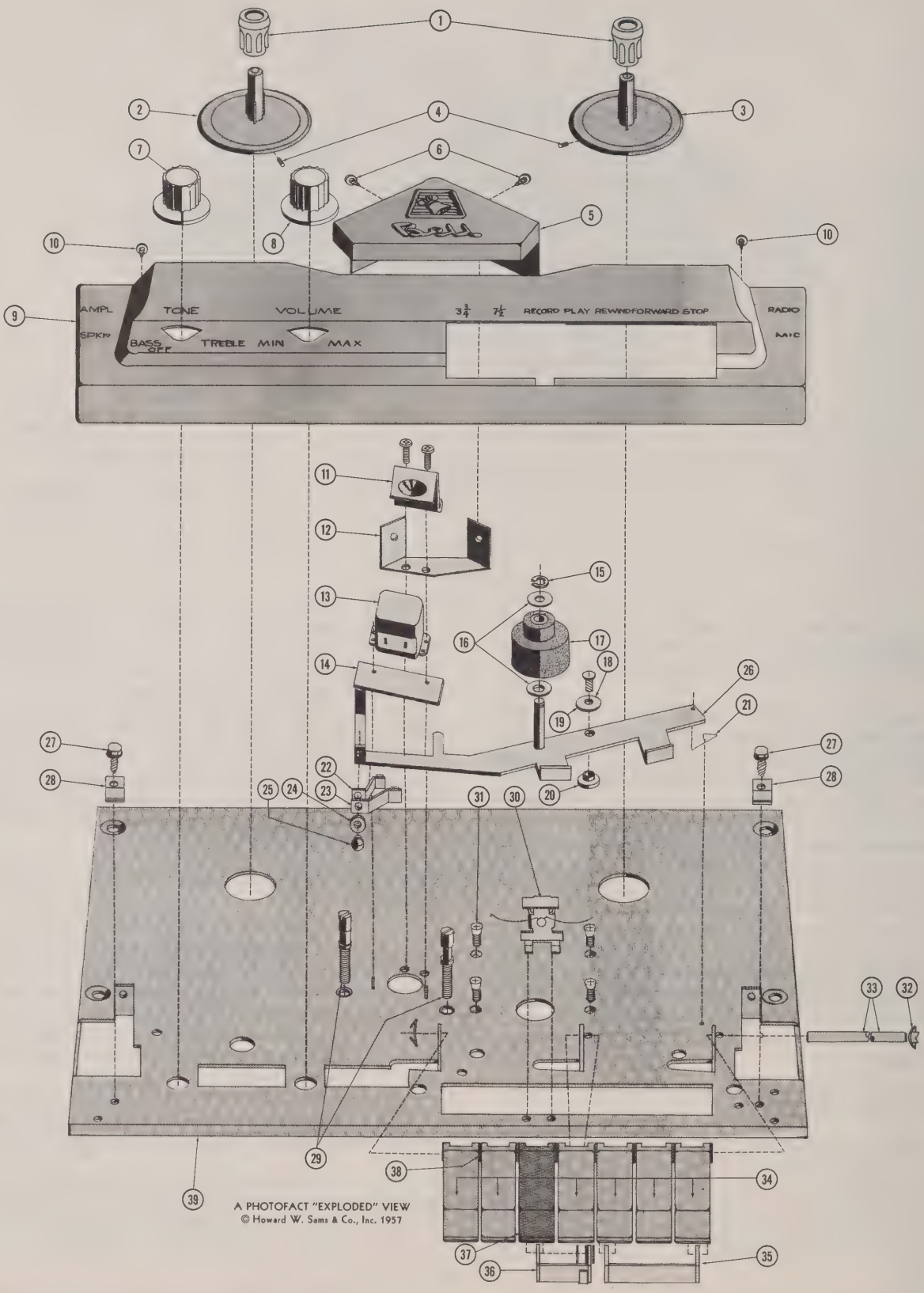


FIGURE 4A. EXPLODED VIEW OF PARTS ABOVE BASEPLATE.

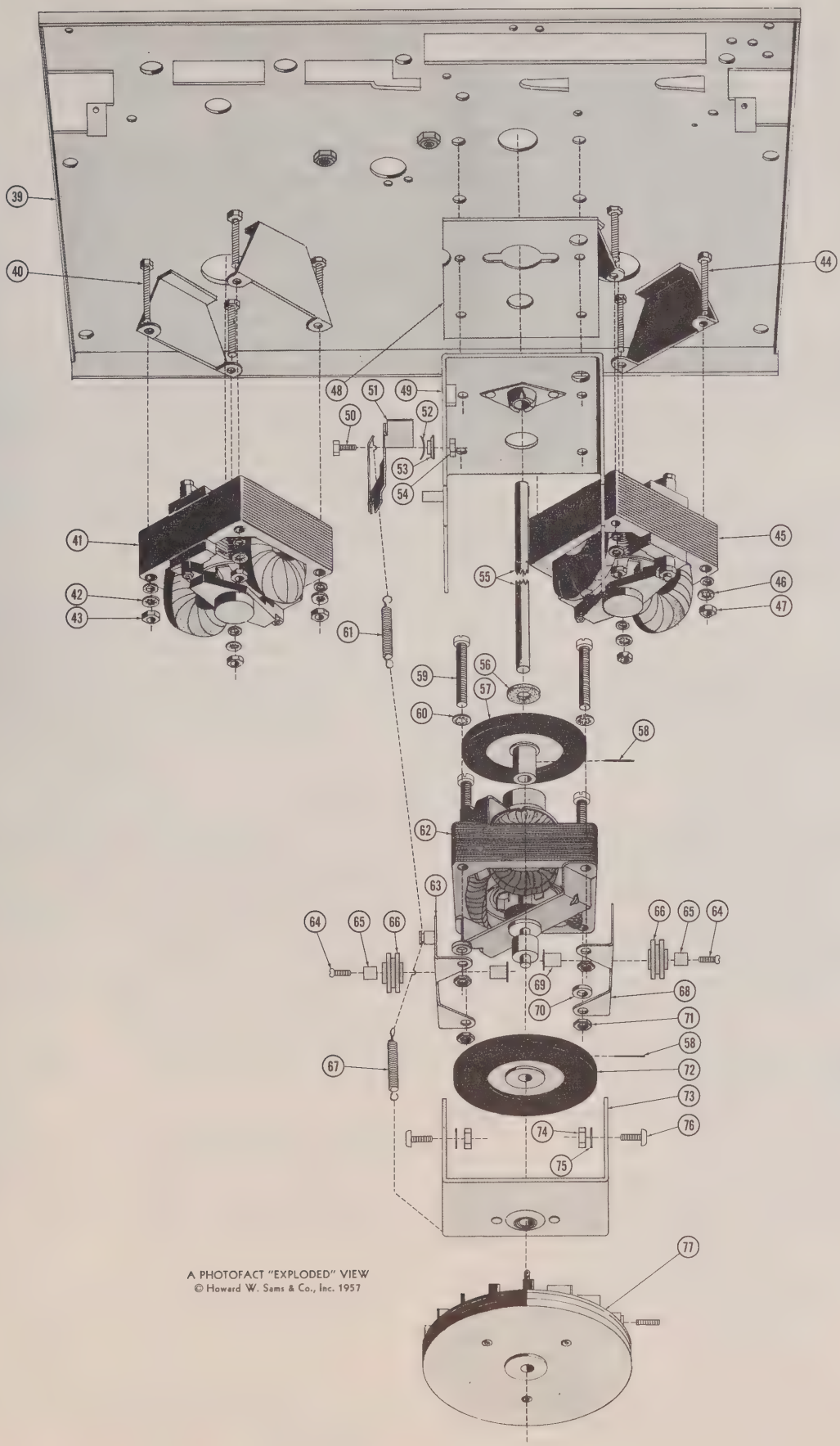


FIGURE 4B. EXPLODED VIEW OF PARTS BELOW BASEPLATE.

CLEANING

The capstan shaft (portion extending above top deck plate), pressure roller (17), tape guides (29), and play-record-erase head (13) are subject to an accumulation of tape coating oxide which is worn off the tape as it passes these parts. These parts should be cleaned approximately every ten hours of running time. All of these parts except the pressure roller (17) may be cleaned with head cleaning solvent, alcohol, or carbon tetrachloride. Use alcohol or water when cleaning the pressure roller; never use carbon tetrachloride when cleaning any rubber driving surface.

CAUTION: To prevent scratching the head pole pieces, never use a metal tool when cleaning the play-record-erase head (13).

LUBRICATION

Lubricants applied at time of manufacture are sufficient to last for a long period of time, but in case parts are replaced, or after each 1000 hours of operation — more or less, lubricate as follows:

1. Apply one drop of #10 motor oil to the top and bottom bearings of the take-up motor (45) and the rewind motor (41). An oiling hole is provided in each bearing holder casting.

2. Apply one drop of #10 motor oil to the top and bottom bearings of the capstan motor (62). Caution: After oiling this motor, be certain that no oil seeps onto the motor pulleys.

3. Apply one drop of #10 motor oil to the top and bottom capstan bearings. Caution: After oiling these bearings be certain that no oil seeps onto the rubber idlers (57 and 72) or onto the portion of the capstan shaft which extends above the top deck plate.

4. Apply one drop of #10 motor oil to the pressure roller bearing (17).

NOTE: Only a very small amount of oil is needed on each bearing. It is desirable to use too little rather than too much for less trouble is likely to result. Oil on the running surfaces between the motor pulleys and the rubber idlers is often a cause for poor or no drive as well as excessive wow and flutter.

TROUBLES AND REMEDIES

Poor Tape Drive In Play and Record —

Poor tape drive can be caused by:

1. Oil or grease on the driving surfaces of capstan drive wheel (57) and the upper pulley on the capstan motor (62). This will cause poor tape drive when operating in the 7 1/2 inch per second speed position.

2. Oil or grease on the driving surfaces of the capstan drive wheel (72) and the lower pulley on the capstan motor (62). This will cause poor tape drive when operating in the 3 3/4 inch per second speed position.

3. Oil, grease or tape coating oxide on the pressure roller (17) and the upper portion of the capstan shaft will cause poor tape drive in both the 3 3/4 and 7 1/2 inch per second speed position.

CAUTION: Use alcohol or water when cleaning rubber driving surfaces. Never use carbon tetrachloride when cleaning rubber parts.

4. Spring (67) disconnected or missing. If this spring is disconnected there will be no tape drive when operating the recorder in the 7 1/2 inch per second speed position. Replace spring (67).

5. Spring (61) disconnected or missing. If this spring is disconnected there will be no tape drive when operating the recorder in the 3 3/4 inch per second speed position. Replace spring (61).

Take-Up Reel Will Not Take Up Tape In Play Or Record Position —

1. Set screw (4) in take-up reel platform (3) loose, causing the reel platform to slip on the motor shaft. Tighten the set screw.

2. Resistor (R26) open. Replace.

Recorder Will Not Rewind Tape —

1. Set screw (4) in supply reel platform (2) loose, causing the reel platform to slip on the rewind motor shaft. Tighten the set screw.

Dynamic Brakes Do Not Function Properly —

1. Check selenium rectifier (M1).

2. Check resistors (R25 and R27). If either of these resistors is open, there will be no hold-back tension on the rewind reel when in the "Play" or "Record" mode.

3. If, when going from "Rewind" to "Stop", tape spills from the take-up reel (3), check resistor (R25).

4. If, when going from "Fast Forward" to "Stop", tape spills from the rewind reel (2), check resistor (R27).

Normal DC voltages for selenium rectifier (M1) and motors (41) and (45) are as follows:

Selenium rectifier (M1), "Play" position — 30 volts DC.

Rewind motor (41), "Play or Record" — 8 volts DC.

Rewind motor (41) in "Stop" after "Play or Record" — 28 volts DC.

Take-up motor (45) in "Stop" after "Play or Record" — 17 volts DC.

AMPLIFIER TESTS AND REPAIRS

1. Check all tubes, inspect wiring and function switch (M5) for poor or open connections.

2. Test all four jacks for open or shorted circuits. These jacks must not ground against cover plate (9).

3. Refer to schematic for all voltage and resistance readings.

4. Test bias oscillator as follows: Connect a AC vacuum tube voltmeter across the erase head winding at the play-record-erase head socket. Due to high frequency, use unshielded wiring. Place recorder in "Record" position. Voltage should be 50 to 68 volts.

Check bias and erase frequency with a signal generator and scope. This should be 58 to 65 kc.

Check bias voltage across play-record head winding at the play-record-erase head socket.

A. 30 to 50 volts at 7 1/2 inches per second.

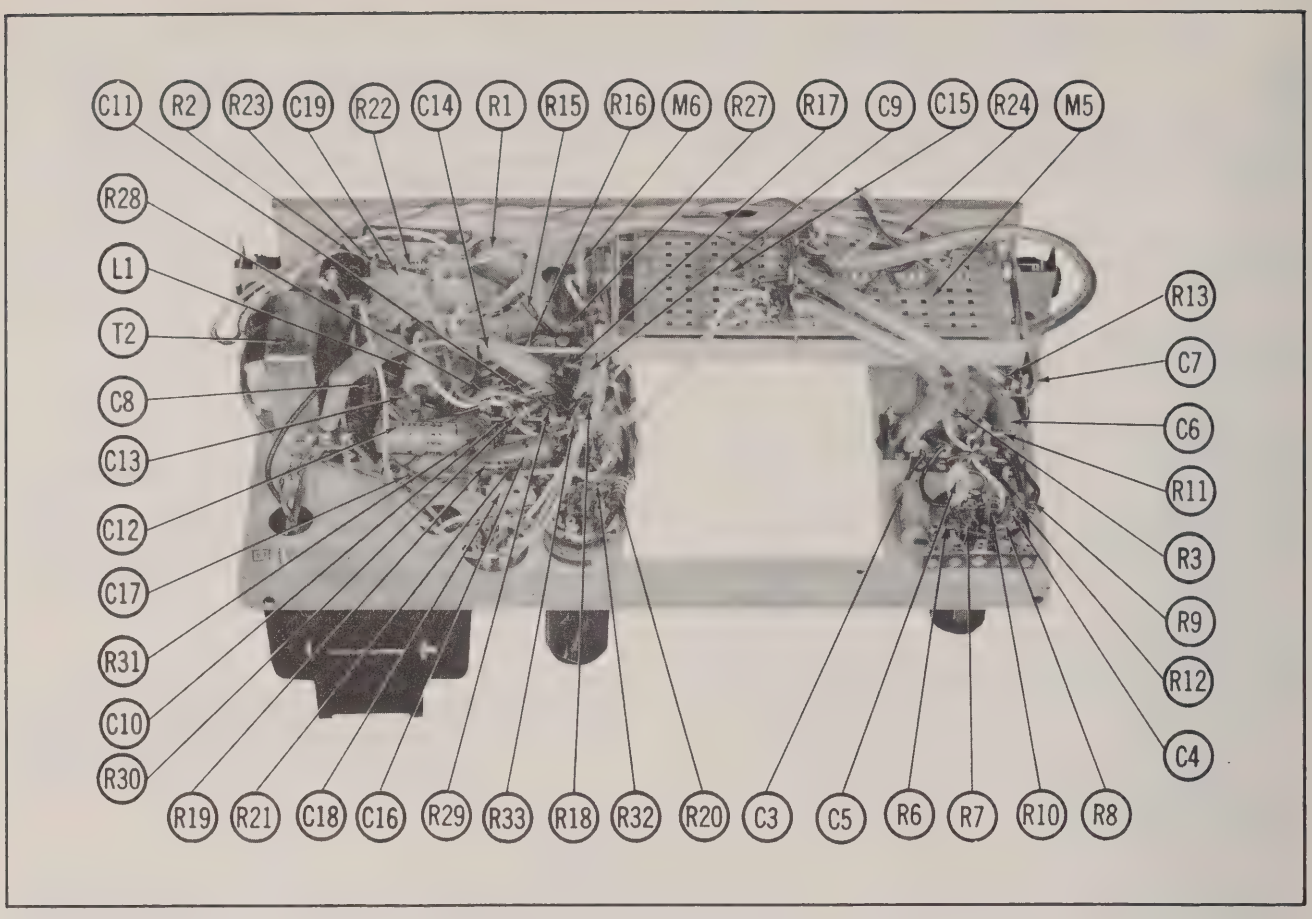
B. 10 to 17 volts at 3 3/4 inches per second.

5. The play-record-erase head may be tested for continuity if suspected of being open. The erase winding should be approximately 10 ohms and the play-record winding about 160 ohms.

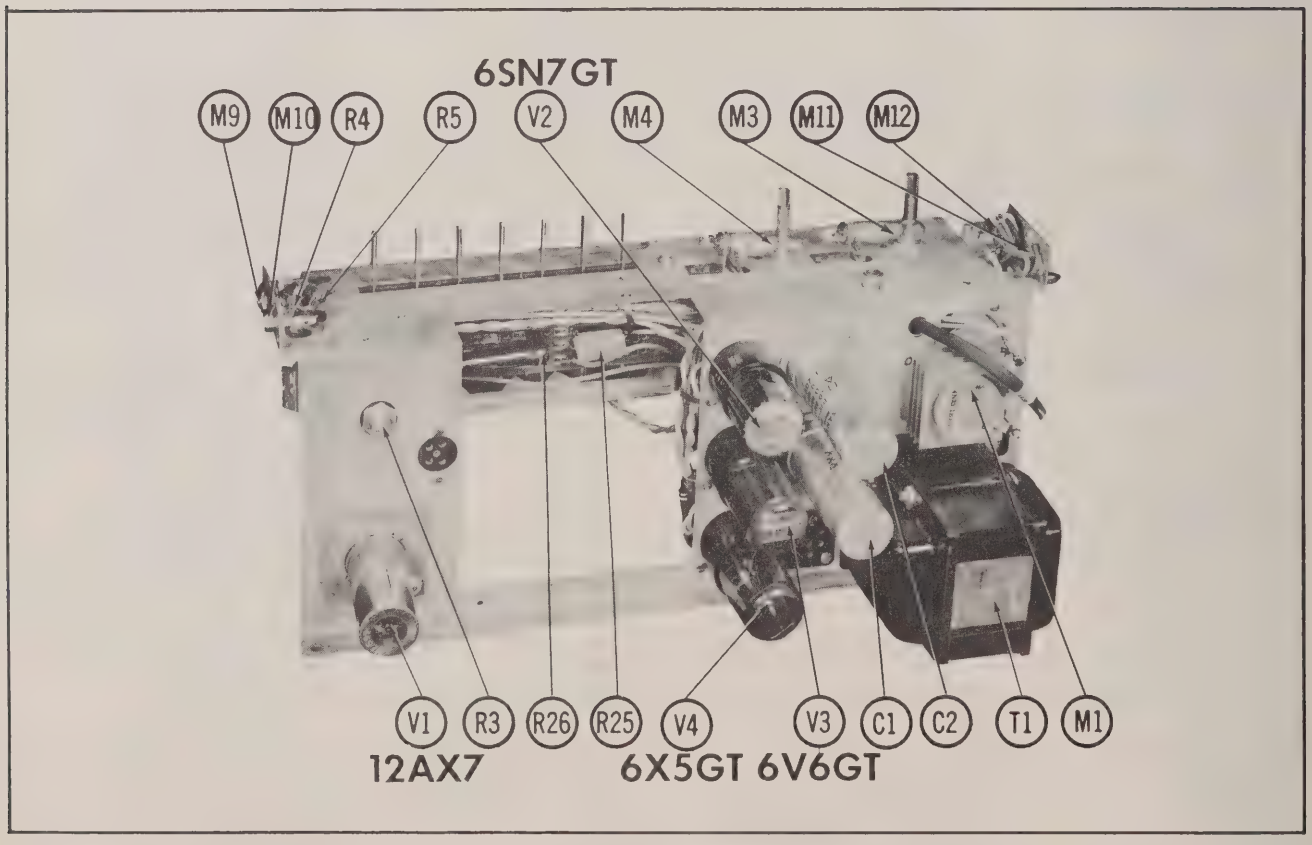
CAUTION: Whenever the head is tested for continuity it will become magnetized to some extent. Therefore, always demagnetize head after testing.

ELECTRICAL PARTS LIST

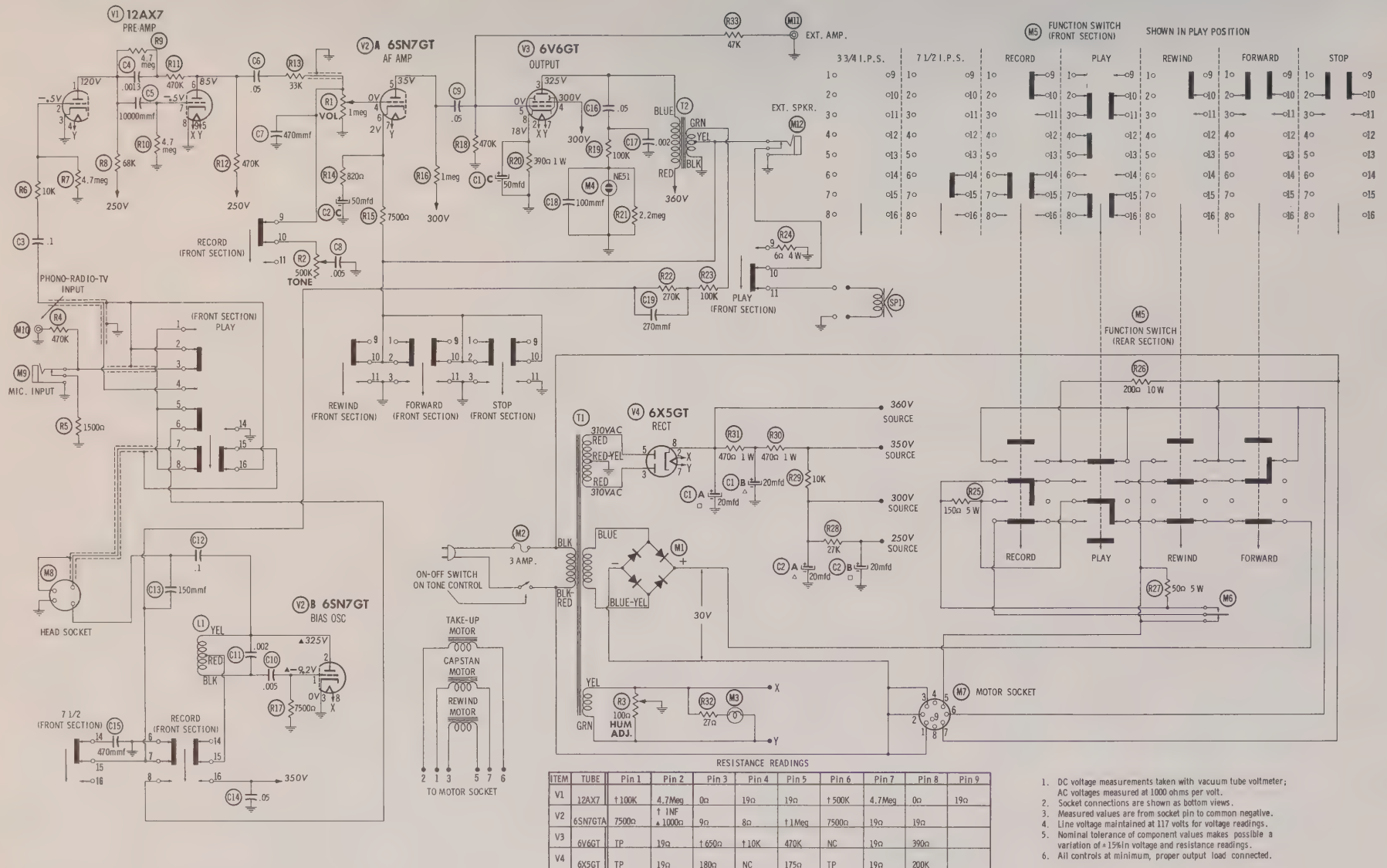
Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
V1		12AX7, Pre-Amp.	R10		Resistor, 4.7 meg., 1/2 Watt
V2		6SN7GT, Bias Osc.-AF Amp.	R11		Resistor, 470 K Ω, 1/2 Watt; ±5%
V3		6V6GT, Audio Output	R12		Resistor, 470 K Ω, 1/2 Watt
V4		6X5GT, Rectifier	R13		Resistor, 33 K Ω, 1/2 Watt
C1A	B-20048P28	Cap., Elect., 20 mfd. @ 450 V.	R14		Resistor, 820 Ω, 1/2 Watt
C1B		Cap., Elect., 20 mfd. @ 450 V.	R15		Resistor, 7500 Ω, 1/2 Watt
C1C		Cap., Elect., 50 mfd. @ 50 V.	R16		Resistor, 1 meg., 1/2 Watt
C2A	B-20048P28	Cap., Elect., 20 mfd. @ 450 V.	R17		Resistor, 7500 Ω, 1/2 Watt; ±5%
C2B		Cap., Elect., 20 mfd. @ 450 V.	R18		Resistor, 470 K Ω, 1/2 Watt
C2C		Cap., Elect., 50 mfd. @ 50 V.	R19		Resistor, 100 K Ω, 1/2 Watt
C3	B-20047P98	Cap., Molded Tub., .1 mfd. @ 200V.	R20		Resistor, 390 Ω, 1 Watt
C4	B-20047P14	Cap., Molded Tub., .0013 mfd. @ 400 V.	R21		Resistor, 2.2 meg., 1/2 Watt
			R22		Resistor, 270 K Ω, 1/2 Watt
C5	B-20141P1	Cap., Ceramic Disc, 10,000 mmf @ 500 V.	R23		Resistor, 100 K Ω, 1/2 Watt
			R24	B-20256P18	Resistor, 6 Ω, 4 Watt
C6	B-20047P81	Cap., Molded Tub., .05 mfd. @ 400 V.	R25	B-20256P16	Resistor, 150 Ω, 5 Watt
C7	B-20049P87	Cap., Mica, 470 mmf. @ 500 V.	R26	B-20256P17	Resistor, 200 Ω, 10 Watt
C8	B-20047P86	Cap., Molded Tub., .005 mfd. @ 400 V.	R27	B-20256P15	Resistor, 50 Ω, 5 Watt
			R28		Resistor, 27 K Ω, 1/2 Watt
C9	B-20047P81	Cap., Molded Tub., .05 mfd. @ 400 V.	R29		Resistor, 10 K Ω, 1/2 Watt
C10	B-20047P86	Cap., Molded Tub., .005 mfd. @ 400 V.	R30		Resistor, 470 Ω, 1 Watt
C11	B-20047P17	Cap., Molded Tub., .002 mfd. @ 400 V.	R31		Resistor, 470 Ω, 1 watt
C12	B-20047P96	Cap., Molded Tub., .1 mfd. @ 400 V.	R32		Resistor, 27 Ω, 1/2 Watt
C13	B-20049P98	Cap., Mica, 150 mmf. @ 500 V.	R33		Resistor, 47 K Ω, 1/2 Watt
C14	B-20047P81	Cap., Molded Tub., .05 mfd. @ 400 V.	T1	B-20366	Power Transformer
C15	B-20049P87	Cap., Mica, 470 mmf. @ 500 V.	T2	B-20352	Output Transformer
C16	B-20047P81	Cap., Molded Tub., .05 mfd. @ 400 V.	SP1	B-20111P29	Speaker, P.M.; 5 1/4 inch Round
C17	B-20047P17	Cap., Molded Tub., .002 mfd. @ 400 V.	L1	B-23704	Bias Osc. Coil
			M1	B-20107-P10	Selenium Rectifier
C18	B-20049P7	Cap., Mica, 100 mmf. @ 500 V.	M2	B-20043P31	Fuse, Pig-Tail - 3 Amp. GJV
C19	B-20049P64	Cap., Mica, 270 mmf. @ 500 V.	M3		Pilot Lamp, #47
R1	B-20066P106	Volume Control, 1 meg.	M4		Neon Lamp, #NE-51
R2	B-20066P108	Tone Cont. and On-Off Switch, 500 KΩ.	M5	B-25251	Function Switch
			M6	A-25342	Leaf Switch, "Memory" Braking Switch
R3	B-20066P72	Hum Adj. Cont., 100Ω	M7	B-20209P30	Motor Socket, 9 Pin
R4		Resistor, 470K Ω, 1/2 Watt	M8	B-20209P20	Head Socket, 4 Pin
R5		Resistor, 1500 Ω, 1/2 Watt	M9	B-20209P32	Mic. Input Jack
R6		Resistor, 10 K Ω, 1/2 Watt	M10		Radio Input Jack
R7		Resistor, 4.7 meg., 1/2 Watt	M11		Ext. Ampl. Output Jack
R8		Resistor, 68 K Ω, 1/2 Watt	M12	B-20209P32	Ext. Spkr. Output Jack
R9		Resistor, 4.7 meg., 1/2 Watt			



AMPLIFIER — FRONT VIEW



AMPLIFIER — REAR VIEW



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†100K	4.7Meg	0Ω	19Ω	19Ω	†500K	4.7Meg	0Ω	19Ω
V2	6SN7GTA	7500Ω	† 1NF ▲ 1000Ω	9Ω	8Ω	†1Meg	7500Ω	19Ω	19Ω	
V3	6V6GT	TP	19Ω	†650Ω	†10K	470K	NC	19Ω	390Ω	
V4	6X5GT	TP	19Ω	180Ω	NC	175Ω	TP	19Ω	200K	

VOLTAGE AND RESISTANCE MEASUREMENTS TAKEN IN "PLAY" POSITION UNLESS OTHERWISE DESIGNATED.

▲ MEASURED IN "RECORD" POSITION
† MEASURED FROM PIN 8 OF V4.
NC NO CONNECTION
TP TIE POINT

1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings.
6. All controls at minimum, proper output load connected.

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BELL SOUND
MODEL RT-204

MECHANICAL PARTS LIST

Ref. No.	Part No.	Description
1		#14 Crutch Tip, 1/4 I.D.
2	A-25328	Reel Platform, Supply
3	A-25328	Reel Platform, Takeup
4		#8-32X 3/16 Set Screw, Bristol Cup Point
5	B-25292	Head Cover
6		#6X1/4 Sheet Metal Screw
7	B-20148P51	Tone Control On-Off Knob
8	B-20148P51	Volume Control Knob
9	D-25291	Cover Plate
10		#6X 1/4 Sheet Metal Screw
11	A-25264	Head Retaining Spring
12	A-25319	Head Cover Bracket
13	B-23727P2	Play-Record-Erase Head
14	A-25402	Head Plate
15	A-23822	Retaining Ring
16	A-23763P2	Nylon Washer
17	A-23518P1	Pressure Roller Assembly
18		#6-32X1/4 Screw, Phillips Binder Head
19	B-20089P48	Flat Washer
20	A-25315	Slide Bearing
21	A-25270	Pressure Roller Spring
22	B-25407	Erase Pressure Pad Ass'y
23	A-25334P1	Record Pressure Pad Ass'y
	A-25331	Felt Pad
24		Lockwasher
25		#6-32X1/4 Phillips Rd. Hd. Mach. Screw
26	B-25332	Pressure Roller Actuator Ass'y
27		Hex. Hd. Self Tapping Screw
28		Cover Plate Retaining Clip
29	A-25265	Tape Guides
30	A-25391	Record Latch Ass'y
31		#6-32X1/4 Phillips Flat Hd. Mach. Screw
32		Tinnerman Push Nut
33	A-25269	Shaft
34	A-25268P1	Key (6 used)
35		Stop-Rewind-Forward Key Actuator
36		Play-Record Key Actuator
37	A-25268P2	Record Key (red)
38	B-20089P58	Fibre Washer (13 used)
39	D-25340	Deck Plate Assembly
40		#6-32 X 1 Hex. Hd. Mach. Screw
41	B-25400P1	Rewind Motor
42		Lockwasher
43		#6 Hex. Nut
44		#6-32X1 Hex. Hd. Mach. Screw
45	B-25400P2	Take-up Motor
46		Lockwasher
47		#6 Hex. Nut
48	A-25399	Gasket
49		Motor and Capstan Mtg. Housing
50		#6-32X1/4 Hex. Screw
51	A-25394	Capstan Lever Weld Ass'y
52		Spring Washer
53		Shoulder Washer
54		#6 Hex. Nut.
55	A-25389	Capstan Shaft
56	B-20089-P26	Felt Washer
57	B-25386P1	Capstan Drive Wheel, 7 1/2 I.P.S.
58		Roll Pin
59		#6-32X1 1/4 Rd. Hd. Mach. Scres
60		Lockwasher
61	A-25397P1	Motor Spring
62	B-25388	Capstan Motor Assembly
63	A-25395	Capstan Motor Support Assembly
64		6-32X3/8 Fil. Hd. Mach. Screw
65	B-20025P23	Spacer
66	B-20029P41	Grommet
67	A-25397P2	Motor Spring
68	A-25382	Capstan Motor Support
69		Eyelet
70	A-25406	Motor Spacer
71		#6 Hex. Nut
72	B-25386P2	Capstan Drive Wheel, 3 3/4 I.P.S.
73	B-25381	Capstan Yoke
74		#8-32 Hex. Nut
75		Lockwasher
76		#8-32X3/8 Phillips Hd. Mach. Screw
77	A-25257	Flywheel Assembly

FIRESTONE MODELS 13-G-208, 13-G-209 (Code 199-6-A2010)

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FIRESTONE MODELS 13-G-208, 13-G-209 (Code 199-6-A2010)

TRADE NAME	Firestone Models 13-G-208, 13-G-209 (Code 199-6-A2010)
SUPPLIER	Firestone Tire & Rubber Co., 1200 Firestone Parkway, Akron, Ohio
TYPE SET	Television Receiver
TUBES	Thirteen
POWER SUPPLY	110-120 Volts AC - 60 Cycles RATING - 115 Watts, 1.14 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 7 push-on type control knobs.
2. Remove 6 metal screws, 2 antenna leads and rear cover.
3. Remove picture tube socket, Ion trap, HV lead and 2 speaker leads.
4. Remove 2 metal screws holding speaker and remove speaker.
5. Remove 2 metal screws holding AC interlock bracket.
6. Remove 2 chassis bolts from bottom.
7. Remove 1 top chassis bolt (middle one in handle).
8. Remove chassis.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS

Care should be exercised when connecting test equipment or physcially contacting chassis.

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FIRESTONE MODELS 13-G-208, 13-G-209 (Code 199-6-A2010)

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the VHF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs. The HIGH band adjustments may be made with the slug located near the right side, the LOW band by slug near the bottom of the tuner. Adjust from highest to lowest channel.

PICTURE TUBE SAFETY GLASS CLEANING

1. Remove the front handle mounting screw.
2. Remove 2 metal screws on the bottom, holding the front.
3. Remove the front of the cabinet.
4. Remove the clamps holding the safety glass and remove the glass.

FOCUS

Focus may be varied by placement of a strap on the picture tube base between pins 6 and 2 or 6 and 10. Readjust Ion trap for best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

To adjust the horizontal oscillator, remove the rear cover and supply power to the set. Set the horizontal hold control at mid-position and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

FUSES

A 4.7Ω fusible resistor (R68) is used for LV power supply protection.

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

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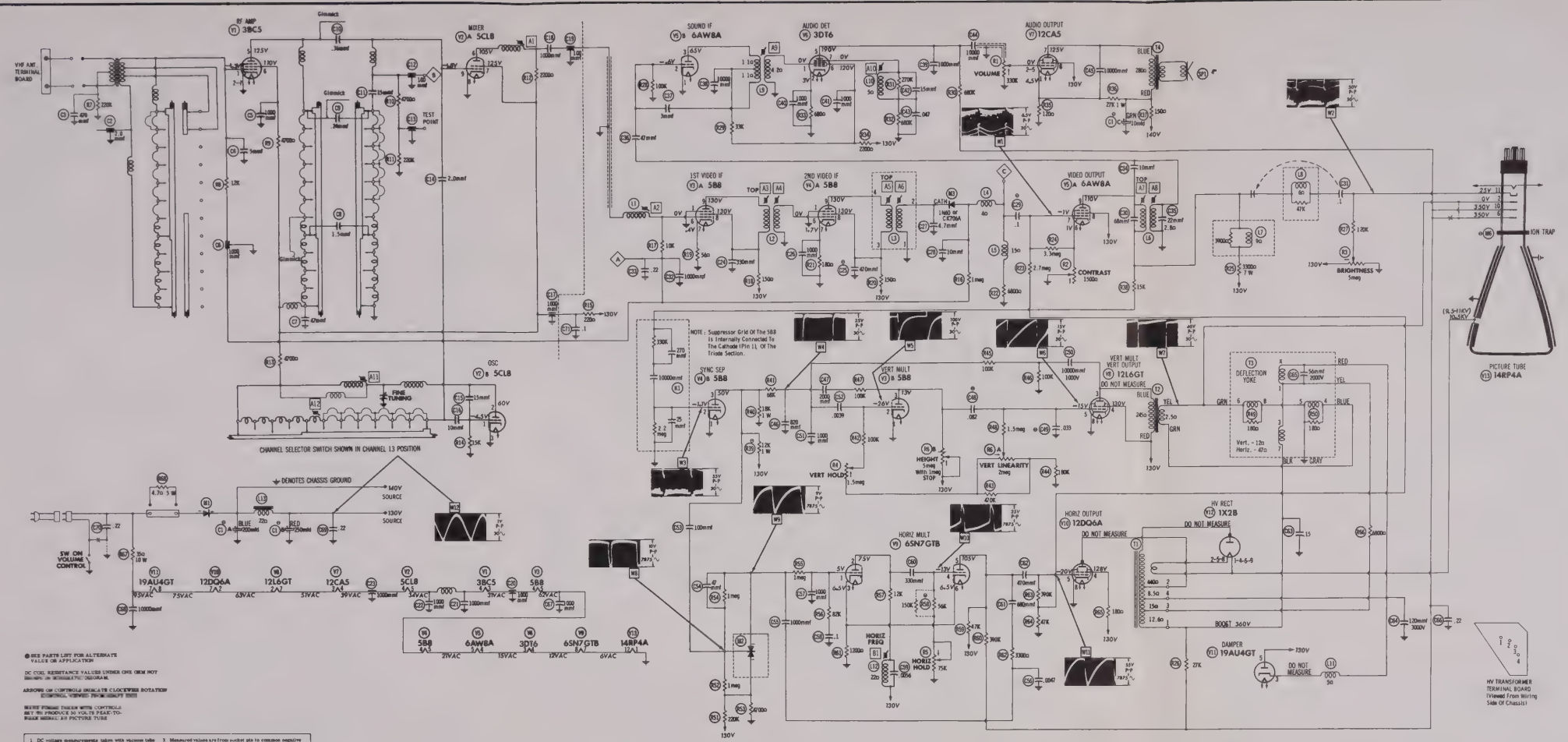
RF AMP V1 3BC5
MIXER V2A 5CL8
OSC V2B 5CL8
SOUND IF V5B 6AW8A
AUDIO DET V6 3DT6
AUDIO OUTPUT V7 12CA5
1ST VIDEO IF V3 A 5B8
2ND VIDEO IF V4 A 5B8
VIDEO OUTPUT V5A 6AW8A
SYNC SEP V4B 5B8
VERT MULT V3B 5B8
VERT MULT VERT OUTPUT V8 12L6GT DO NOT MEASURE
HORIZ MULT V9 6SN7GTB
HORIZ OUTPUT V10 12DQ6A DO NOT MEASURE
HV RECT V12 1X2B DO NOT MEASURE
DAMPER V11 19AU4GT
PICTURE TUBE V13 14RP4A
VHF ANT. TERMINAL BOARD
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
FINE TUNING
VOLUME
CONTRAST 150Ω
BRIGHTNESS 5meg
HEIGHT 5meg With Long STOP
VERT LINEARITY 2meg
VERT HOLD 1.5meg
HORIZ FREQ
HORIZ HOLD 75K
TEST POINT
DEFLECTION YOKE
ION TRAP
BOOST 360V
DENOTES CHASSIS GROUND
140V SOURCE
130V SOURCE
SW. ON VOLUME CONTROL
NOTE - Suppressor Grid Of The 5B8 Is Internally Connected To The Cathode (Pin 1), Of The Triode Section.
19AU4GT 12DQ6A 12L6GT 12CA5 5CL8 3BC5 5B8
5B8 6AW8A 3DT6 6SN7GTB 14RP4A
HV TRANSFORMER TERMINAL BOARD (Viewed From Wiring Side Of Chassis)

- SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
- DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM.
- ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION OF CONTROL, VIEWED FROM KNOB END.
- WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 30 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE

1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction as bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.

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TUBE PLACEMENT CHART

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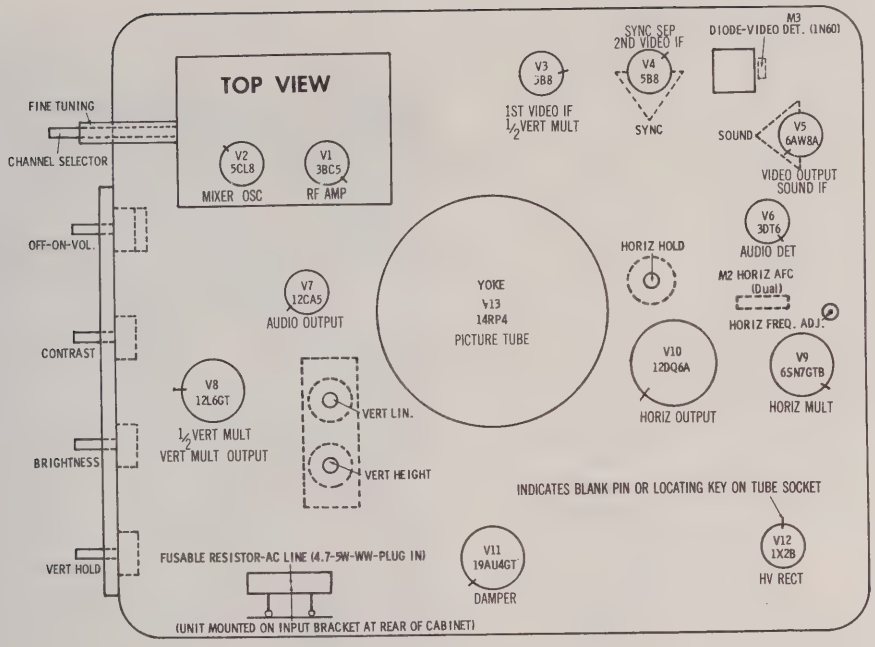


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

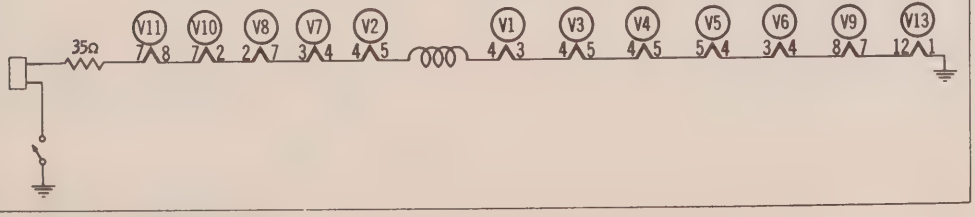
POWER SUPPLY FAILURE
No raster, no sound - **Fusible Resistor (R68), Rectifier (M1)**

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - **V3, V4, Diode (M3), V5**
No pic, no sound, has snow - **V1, V2**
No pic, has sound, has raster - **V5, V13**
Has pic, no sound - **V5, V6, V7**

SYNC FAILURE
No vert. sync - **V3, V4, V8**
No horiz. sync - **V4, Diode (M2), V9**
No vert. or horiz. sync - **V4**

SWEEP FAILURE
No raster, has sound - **M2, V9, V10, V11, V12, V13**
No vertical deflection - **V3, V8**
Poor vert. linearity or foldover - **V3, V8**
Poor horiz. linearity or foldover - **V9, V10, V11**
Narrow picture - **V9, V10, V11, M1**
Vert. off freq. - **V3, V4, V8**
Horiz. off freq. - **V4, M2, V9**

Since this receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative. (See circuit below.)



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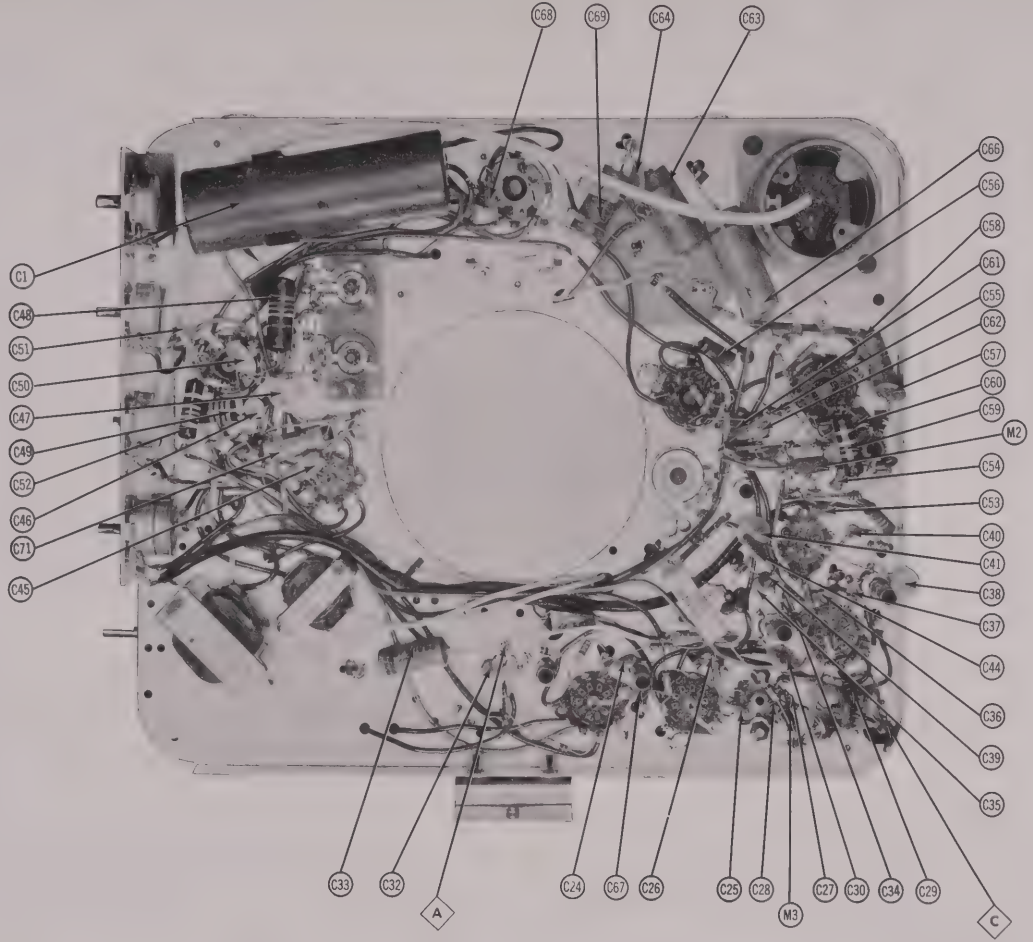


CHASSIS BOTTOM VIEW-CAPACITOR AND ALIGNMENT IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use an isolation transformer to protect the test equipment.
The high voltage lead should be securely taped and kept away from the chassis.

VIDEO IF ALIGNMENT

Connect the negative lead of a 3 volt bias battery to point (A). Positive to chassis.
Disable oscillator by replacing Mixer-Osc. tube 5CL8 (V2) with a 5CL8 with pin 1 removed.
Short the antenna terminals.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	1000MMF ceramic capacitor	High side to point (B). Low side to chassis.	44.0MC (10MC Swp)	42.75MC 45.75MC	Any channel.	Vert. amp. thru detector (Fig. 1) to plate, pin 9 of 5B8 (V3). Low side to chassis.	A1, A2	Adjust for response similar to Fig. 2 with markers in proper positions.
2.	"	High side to pin 6 (grid) of 5B8 (V3). Low side to chassis.	"	"	"	Vert. amp. thru detector (Fig. 1) to plate, pin 9 of 5B8 (V4). Low side to chassis.	A3, A4	"
3.	"	High side to pin 6 (grid) of 5B8 (V4). Low side to chassis.	"	"	"	Vert. amp. to point (C). Low side to chassis.	A5, A6	"
4.	"	High side to point B. Low side to chassis.	"	"	"	"		Retouch A1 thru A6 as needed to correct for curve similar to Fig. 3. Remove bias and replace 5CL8 (V2).

SOUND IF ALIGNMENT

Set the contrast control fully clockwise. Set volume control at midrange.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	1000MMF ceramic capacitor	High side to point (C). Low side to chassis.	Not used.	4.5MC (400% 30% AM Mod)	Any non-interfering channel.	Vert. amp. thru detector (Fig. 4) to pin 11 (cathode) of picture tube. Low side to chassis.	A7, A8	Turn A7 fully counter clockwise. Turn A8 fully clockwise. Turn A7 clockwise for MINIMUM 400% indication on scope.
6.	"	"	4.5MC (15KC Swp)	Not used.	"	Across secondary of output transformer.	A8, A9, A10	Use only enough sweep generator output to provide usable pattern on scope. Turn A10 fully counter clockwise. Adjust A8, A9 and A10 for maximum indication on scope. Remove test equipment and tune in a TV station. Retouch A10 for MINIMUM buzz.

OSCILLATOR ALIGNMENT

Turn the set on and tune in the highest high band channel (7-13) operating in the area and adjust A11 for clearest picture and best sound. A11 is located below and to the right of the tuning shaft. Switch the channel selector to the highest low band channel (2-6) operating in the area and adjust A12 for clearest sound and best picture. A12 is located directly to the left of the tuner shaft.

RF AND MIXER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

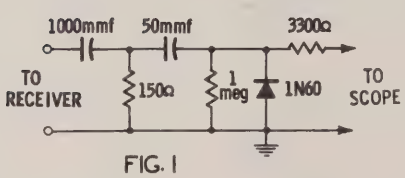


FIG. 1

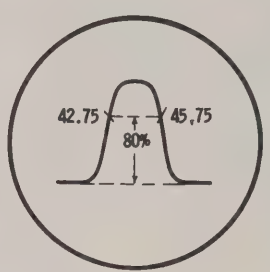


FIG. 2

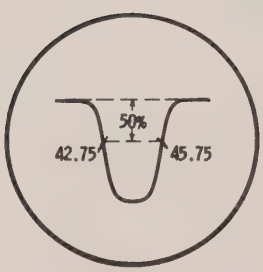


FIG. 3

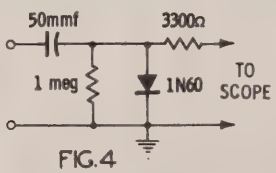
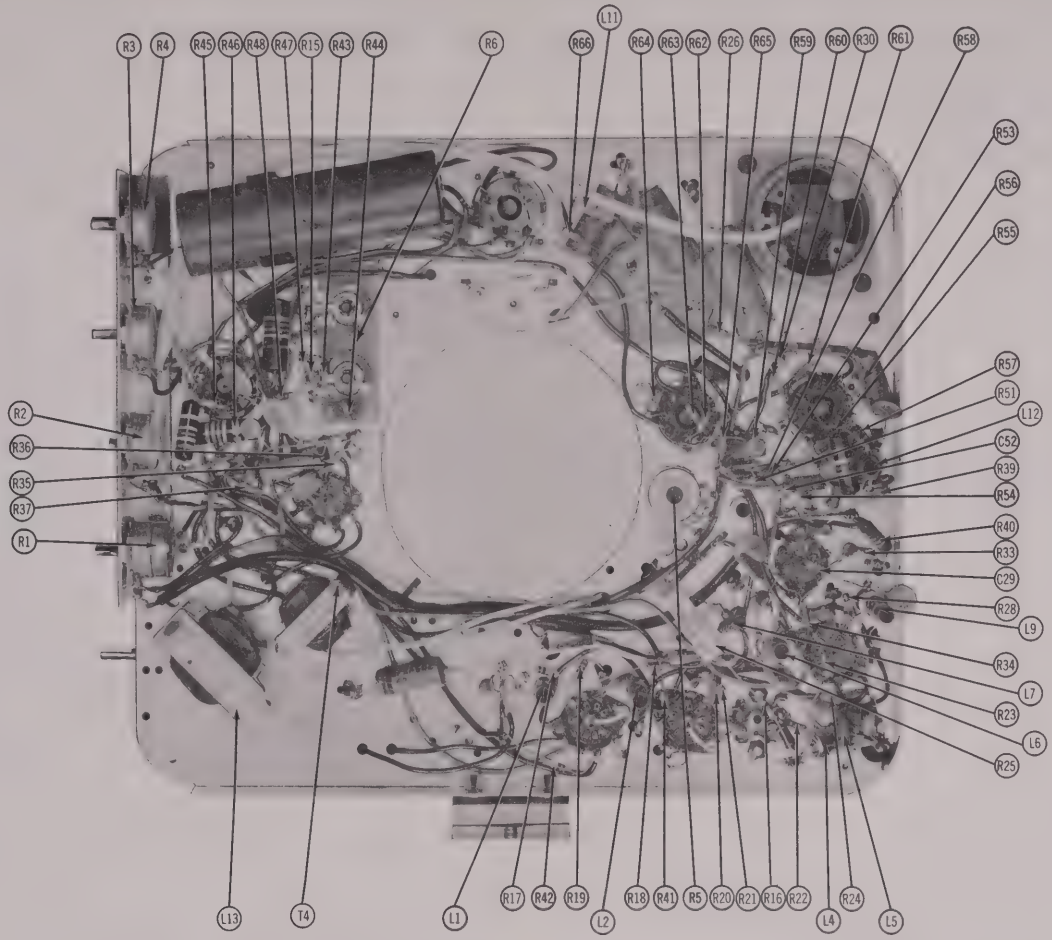


FIG. 4

CHASSIS TOP VIEW



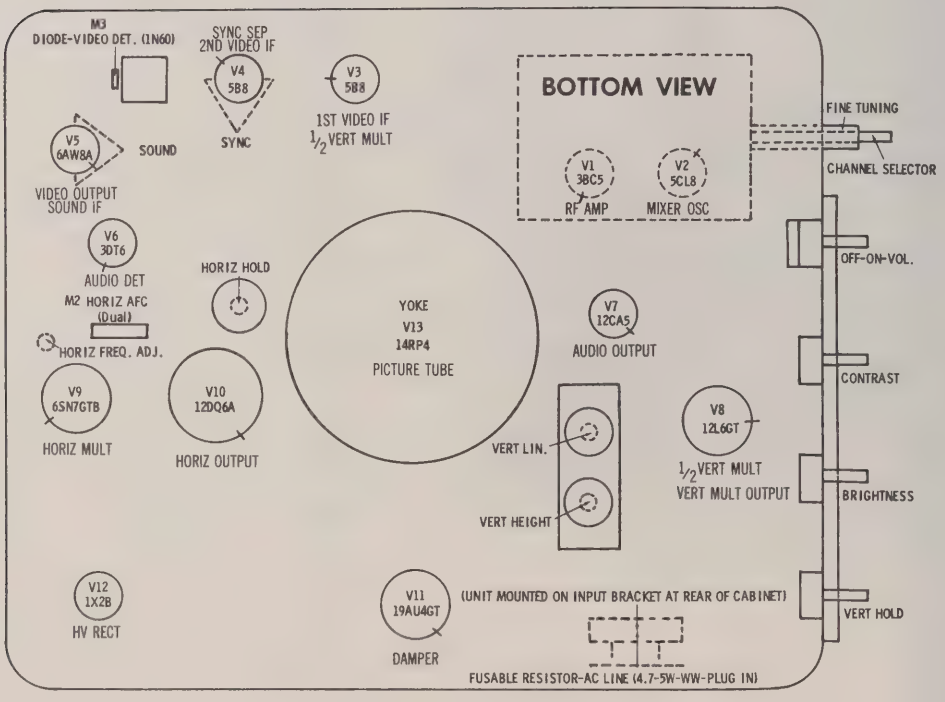
PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

CHASSIS BOTTOM VIEW-RESISTOR AND INDUCTOR IDENTIFICATION

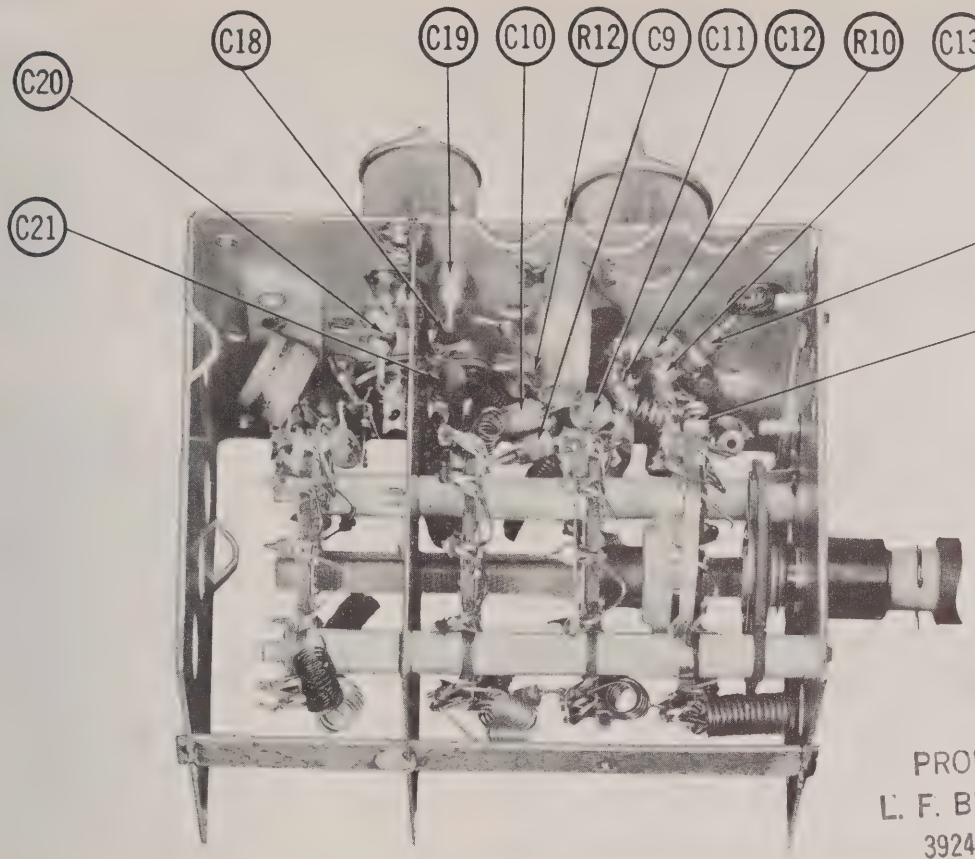
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	3BC5	1Meg	0Ω	6.5Ω	7Ω	†240Ω	†5000Ω	0Ω		
V2	5CL8	15K	†5000Ω	0Ω	7.5Ω	7Ω	†2400Ω	†240Ω	0Ω	220K
V3	5B8	0Ω	●1.3Meg	●†2.7Meg	6.5Ω	6.5Ω	1Meg	56Ω	†170Ω	†170Ω
V4	5B8	0Ω	2.2Meg	†12K	5.5Ω	5Ω	0Ω	180Ω	†170Ω	†170Ω
V5	6AW8A	0Ω	100K	†35K	3.5Ω	5Ω	● 10Ω	1.4Meg	†22Ω	†3300Ω
V6	3DT6	4.2Ω	680Ω	†3.5Ω	3Ω	‡700K	†2200Ω	680K		
V7	12CA5	120Ω	270K	9Ω	7.5Ω	270K	†22Ω	†430Ω		
V8	12L6GTB	TP	10.5Ω	†260Ω	†22Ω	●2.3Meg	TP	9Ω	0Ω	
V9	6SN7GTB	1.8Meg	†12K	1200Ω	●75K	†47K	1200Ω	1.5Ω	3Ω	
V10	12DQ6A	TP	10.5Ω	TP	†200Ω	440K	TP	11.5Ω	0Ω	TOP CAP ‡13Ω
V11	19AU4GT	NC	TP	480K	NC	†22Ω	TP	13Ω	11.5Ω	
V12	1X2B	PINS 1 THRU 9 HAVE INFINITE RESISTANCE								TOP CAP ‡453Ω
V13	14RP4	0Ω	3Ω	Pin 6 ‡27K	Pin 10 ‡27K	Pin 11 ●†120K	Pin 12 1.5Ω			

† MEASURED FROM OUTPUT OF M1.
‡ MEASURED FROM PIN 3 OF V11.
● THIS READING WILL VARY. CONTROL SET FOR NORMAL OPERATION.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART



PROPERTY OF
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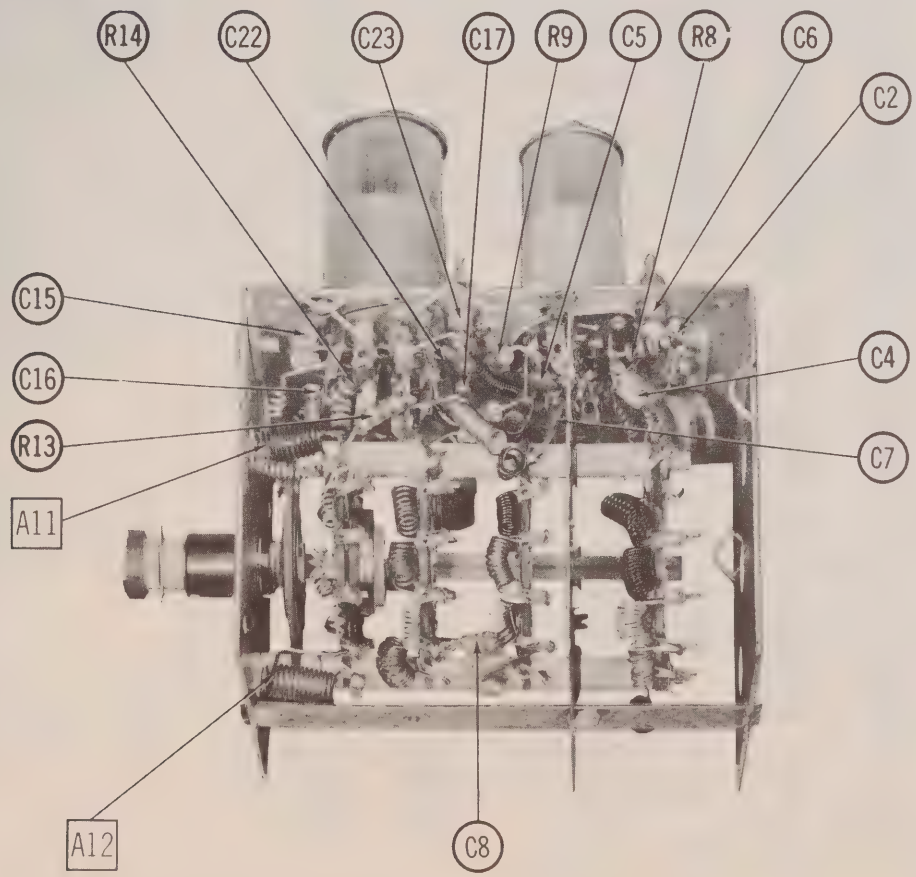
3924 MEADE ST.
DENVER, COLORADO

RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amp.	3BC5	
V2	Mixer-Osc.	5CL8	
V3	1st Video IF - Vert. Mult.	6B8	
V4	2nd Video IF - Sync Sep.	6B8	
V5	Video Output-Sound IF	6AW8A	
V6	Audio Det.	3DT6	
V7	Audio Output	12CA5	
V8	Vert. Mult., Vert. Output	12L6GT	
V9	Horiz. Mult.	6SN7GTB	
V10	Horiz. Output	12DQ6A	
V11	Damper	19AU4GT	
V12	HV Rectifier	1X2B	

PICTURE TUBE

ITEM No	REPLACEMENT DATA: FIRESTONE PART No.	CRT PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	NOTES
V13			14RP4A ① 14RP4	14RP4A ②	① Aluminized ② Silver Screen "85"

ELECTROLYTIC CAPACITORS

ITEM No	RATING: CAP	RATING: VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C3A	200	150	45A292	PRJ-013		WT280	CDST-1015	D-096 *MT-1510	R3294 *
B	250	150							
C	10	150							

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: FIRESTONE PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C2	2.0									
C3	470		47A836	BPD-00047	DD-471	BYAD7A47	ED-470	UC-5347	5GA-T47	
C4	5			NPO-5I 5	TCZ-4R7	C10C5C	TCO-5	ZT-5547	5TCCB-V5	
C5	1000		47-503	BPD-001	DD-103	BYAE5N	ED-1000	DC531	5HK-D1	
C6	1000			EF-001	MFT-1000				503C-D1	
C7	47		47CA30A470M	BPD-000047	DD-470	L10Q47	ED-47	UC-5447	5GA-Q47	
C8	1.5			NPO-5I L 5	TCZ-1R5	C10C15C	TCC-1.5	ZT-5515	5TCCB-V15	
C9	.34									
C10	.35									
C11	15			BPD-000015	DD-150	L10Q15	ED-15	UC-5415	5GA-Q15	
C12										
C13	100			NPO-5I 2. 2	TCZ-2. 2	C10V3C	TCO-3			
C14	2.0									
C15	15			NPO-5I 10	TCZ-10	C10Q1C	TCO-10	ZT-541	5TCC-Q1	N1000
C16	10			EF-001	MFT-1000				503C-D1	
C17	1000			BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C18	1000		47-503							
C19	100									
C20	1000			EF-001	MFT-1000				503C-D1	
C21	1000		47-501	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C22	1000		47-503	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C23	1000			EF-001	MFT-1000				503C-D1	
C24	330		47A841	BPD-00033	DD-331	C10T33	ED-330	UC-5333	5GA-T33	
C25	470		47A843	BPD-00047	DD-471	BYA107A7	ED-470	UC-5347	5GA-T47	
C26	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C27	47		47B403-8	NPO-5I 4. 7	TCZ-4R7	C10V47C	TCC-4.7	ZT-555	5TCCB-V47	
C28	10		47CA30A100K	BI 10	DE-106	LT6Q	GP-10	UC-541	5GA-Q1	
C29	.02	125		P68M-1	DF-104	CUB2P1		GEM-3O1	2TM-P1	Note 1 N75
C30	68		47-635							
C31	.1	200	47DM16-104M2	P68M-1	DF-104	CUB2P1		GEM-3O1	2TM-P1	
C33	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C33	.22	100	47DM16-224M3	P68M-33		CUB2P33		GEM-3023	2TM-P22	
C34	.10		47A180-1	BI 10	DE-106	LT6Q1	GP-10	UC-541	5GA-Q1	
C35	22		47-634							N75
C36	47		47CA30A470M	5I 47	DE-470	LT5Q47	GP-47	UC-5447	5GA-Q47	
C37	3		47A807	5I 3	DE-030	LT5Y3	TCO-3	ZT-553		
C38	10000		47A330	BPD-01	DD-103	BYAE6I	ED-IE	DC531	5HK-S1	
C39	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C40	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C41	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C42	15		47DM80							N080
C43	.047	200	47DM16-473M2	BPD-05	DF-503	CUB3A47		GEM-3147	2TM-S47	
C44	10000		47A334	BPD-01	DD-103	BYAE6I	ED-01	DC531	5HK-S1	
C45	10000		47A334	BPD-01	DD-103	BYAE6I	ED-01	DC531	5HK-S1	
C46	820		47-601	BPD-0008	D6-821	LJQ7E5	ED-820		5GA-T82	
C47	2000		47A395	BPD-002	DD-203	BYAE6D3	ED-003	DC533	5HK-D3	
C48	.083	300								
C49	.033	300		P68M-03	DF-303	CUB3S33		GEM-4133	6TM-S33	
C50	10000	1000	47-601	P25M8-01	DD-103	BYAE10M			10HK8-S1	
C51	1000		47-503	BPD-001	DD-102	BYAE5D1	ED-001	DC531	5HK-D1	
C52	.0039	300	46SR392E4	BPD-004	D6-402	CUB2D39	GP-4000	GEM-434	6TM-D4	
C53	100		47CA30A10M	D6-101		L7E1	GP-100	UC-531	5GA-T1	
C54	47		47CA30A470M	5I 47	D6-470	LT5Q47	GP-47	UC-5447	5GA-Q47	
C55	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C56	.0047	200	47DM16-473K2	BPD-0047	D6-472	CUB2D47	GP-4700	GEM-4347	6TM-D47	
C57	1000		47A330	BPD-001	DD-102	BYAE5D1	ED-1000	DC531	5HK-D1	
C58	.1	200	47DM16-104M2	P68M-1	DF-104	CUB2P1		GEM-301	2TM-P1	
C59	.0056	400	47DR562E4	P68M-005	D6-562	CUB4D5	GP-5600	GEM-435	6TM-D5	
C60	330		47EH3D33K	1684-00033		SW573			M3-333	
C61	680		47EH3D68K	1684-00068		IW5768			M3-347	
C62	470		47A538	BPD-00047	DD-471	BYAD7A47	ED-470	UC-5347	5GA-T47	
C63	.15	500	47DM16-154M5	P68M-15		CUB2P15		GEM-5015	2TM-P15	
C64	120	3000	47-640		DD30-12I	HV3D0712			30GA-T12	
C65	56	3000	47A537		DD30-56	HV A2D056	HD3-56	DC30456	30GA-Q56	
C66	.22	600		P68M-22		CUB6P23		GEM-6023	6TM-P23	
C67	1000		47A330	BPD-001	DD-103	BYAE5D1	ED-1000	DC531	5HK-D1	
C68	10000		47A334	BPD-01	DD-103	BYAE6I	ED-01	DC531	5HK-S1	
C69	.22	200	47DM16-224M2	P68M-22		CUB2P23		GEM-3023	2TM-P23	
C70	.22	600	47DM16-224M3	P68M-33		CUB6P23		GEM-6023	6TM-P23	
C71	.1	300	47DM16-104M3	P68M-1	DF-104	CUB3P1		GEM-316	3TM-P1	

Note 1: Some versions may use .047@ 300V (part #47DM16-473M2) in this application.

PARTS LIST AND DESCRIPTIONS

CONTROLS

ITEM No	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: FIRESTONE PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	330K	½	25B5400	B-50	A47-500K-2	Q13-133	TA334A	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWS-13	T6-1	US-38	
R2A	150Ω	½	25B5390	B-515		Q17-109	U5	Contrast
B	Shaft			Not Req.		Not Req.	Not Req.	
R3A	5Meg	½	25B5401	B-5M		Q17-141	TA5BH	Brightness
B	Shaft			Not Req.		Not Req.	Not Req.	
R4A	1.5Meg	½	25B5402	B-742	A47-1.5Meg-2	Q11-138	U188	Vert. Hold
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
R5A	75K	½	25-1305	B-35	A47-75K-2	Q11-135	PTA15L	Horiz. Hold
B	Shaft			Not Req.	FS3-1/3	Not Req.	Not Req.	
R6A	2Meg	½	25B5380					Vert. Linearity Height With 1Meg Stop
B	5Meg							

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R7	330K		23X3O3234X	BTS-324K	
R8	12K		23X3O123X	BTS-12K	
R9	47OOΩ		23X3O472X	BTS-4700	
R10	47OOΩ		23X3O472X	BTS-4700	
R11	330K		23X3O334X	BTS-330K	
R12	2200Ω		23X3O222X	BTS-2200	
R13	47OOΩ		23X3O472X	BTS-4700	
R14	15K		23X3O153X	BTS-15K	
R15	330Ω		23X3O331X	BTS-330	
R16	1Meg		23X3O105X	BTS-1Meg	
R17	10K		23X3O103X	BTS-10K	
R18	180K		23X3O184X	BTS-180K	
R19	56Ω		23X3O560X	BTS-56	
R20	150Ω		23X3O151X	BTS-150	
R21	180Ω		23X3O181X	BTS-180	
R22	6800Ω		23X3O682X	BTS-6800	
R23	3.7Meg		23X3O375X	BTS-3.7Meg	
R24	3.3Meg		23X3O335X	BTS-3.3Meg	
R25	330Ω	7	23X3O331X	PWV-330	
R26	27K		23X3O273X	BTS-27K	
R27	120K		23X3O124X	BTS-120K	
R28	100K		23X3O104X	BTS-100K	
R29	33K		23X3O333X	BTS-33K	
R30	680K		23X3O684X	BTS-680K	
R31	370K		23X3O374X	BTS-370K	
R32	390K		23X3O394X	BTS-390K	
R33	680Ω		23X3O681X	BTS-680	
R34	1200Ω		23X3O231X	BTS-1200	
R35	150K		23X3O154X	BTS-150	
R36	27K	1	23X3O273X	BTA-27K	
R37	180Ω		23X3O181X	BTS-180	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R38	15K		23X3O153X	BTS-15K	
R39	12K	1	23X3O123X	BTA-12K	
R40	18K	1	23X3O183X	BTA-18K	
R41	68K		23X3O683X	BTS-68K	
R42	100K		23X3O104X	BTS-100K	
R43	470K		23X3O474X	BTS-470K	
R44	180K		23X3O184X	BTS-180K	
R45	100K		23X3O104X	BTS-100K	
R46	100K		23X3O104X	BTS-100K	
R47	100K		23X3O104X	BTS-100K	
R48	1.5Meg		23X3O155X	BTS-1.5Meg	
R49	180Ω		23X3O181X		
R50	180Ω		23X3O181X		
R51	220K		23X3O224X	BTS-220K	
R52	1Meg		23X3O105X	BTS-1Meg	
R53	470OΩ		23X3O472X	BTS-4700	
R54	1Meg		23X3O105X	BTS-1Meg	
R55	1Meg		23X3O105X	BTS-1Meg	
R56	82K		23X3O823X	BTS-82K	
R57	12K		23X3O123X	BTS-12K	
R58	56K		23X3O563X	BTS-56K	Note 1
R59	47K		23X3O473X	BTS-47K	
R60	390K		23X3O394X	BTS-390K	
R61	1300Ω 5%		23X3O132X	BTS-1300 5%	
R62	3300Ω		23X3O332X	BTS-3300	
R63	390K		23X3O394X	BTS-390K	
R64	47K		23X3O473X	BTS-47K	
R65	160Ω		23X3O161X	BTS-160	
R66	8800Ω		23X3O882X	BTS-8800	
R67	25Ω	10	24-1066	1 3/4A-35	
R68	4.7Ω	5	24B1154		

Note 1: Some versions may use an 82K (part #23X3O823X), an 82K paralleled by 150K, or a 68K (part #23X3O683X) in this application.

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	RCA TYPE No.	Ram PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	Horiz. Output Trans.	55-304							
T2	Vert. Output Trans.	55-309	21900 ①					25675 ②	
T3	Yoke(90°) Horiz(24.5MH) Vert(11.5MH)	53-398							

① Connect #1 to plate; #2 to B+; #7 to yoke terminal #4, #10 to yoke terminal #8.
② Connect #1 to plate; #2 to B+; #7 to yoke terminal #8, #10 to yoke terminal #4.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE: PRI.	IMPEDANCE: SEC.	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	NOTES
T4	4500Ω	3-4Ω	55C306	EU10T ①	A-3036	A-3077 ②	34B81 ③	S-6X	① Drill one new mtg. hole.

SPEAKER

ITEM No.	TYPE: SIZE	TYPE: FIELD	TYPE: V. C. IMP.	REPLACEMENT DATA: FIRESTONE PART No.	QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	85C175	4A9T	

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: FIRESTONE PART No.	IRC PART No.	NOTES
R69	180Ω		23X3O181X		
R70	180Ω		23X3O181X		
R71	220K		23X3O224X	BTS-220K	
R72	1Meg		23X3O105X	BTS-1Meg	
R73	470K		23X3O474X	BTS-470K	
R74	470Ω		23X3O471X	BTS-470	
R75	1Meg		23X3O105X	BTS-1Meg	
R76	82K		23X3O823X	BTS-82K	
R77	12K		23X3O123X	BTS-12K	
R78	56K		23X3O563X	BTS-56K	
R79	47K		23X3O473X	BTS-47K	
R80	390K		23X3O394X	BTS-390K	
R81	1300Ω 5%		23X3O132X	BTS-1300 5%	
R82	3300Ω		23X3O332X	BTS-3300	
R83	390K		23X3O394X	BTS-390K	
R84	47K		23X3O473X	BTS-47K	
R85	160Ω		23X3O161X	BTS-160	
R86	8800Ω		23X3O882X	BTS-8800	
R87	25Ω	10	24-1066	1 3/4A-35	
R88	4.7Ω	5	24B1154		

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA: FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	1st Video IF	51-3167				
L2	2nd Video IF	51-3168				
L3	3rd Video IF	50-584				
L4	RF Choke	53A307	19-1008		4834	18 Microhenries
L5	Shunt Peaking Coil	51-3123	19-1080		6148	710 Microhenries
L5A	4. 5MC Trap	51B1996				
B	1st Sound IF				6134a	396 Microhenries; Wound on 39000Ω resistor.
L7	Shunt Peaking Coil	51-3191	19-1409a			
L8	Series Peaking Coil	51-3184	19-1180 *		6130 *	160 Microhenries, wound on 27K resistor
L9	2nd Sound IF	51-3166				
L10	Quadrature Coil	51B1957			1680	7.5 Microhenries; IRC part #CLA
L11	RF Choke	53-343				

* Paralled with 39000Ω resistor
* Paralled with 27K resistor.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	REPLACEMENT DATA: DC RES. PRI.	DC RES. SEC.	FIRESTONE PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L12			51-3169	19-1575		6310 ①			21B-4	

① Enlarge mounting hole. A 2900MMF capacitor may have to be used in place of .0056 (C56).

FILTER CHOKE

ITEM No.	RATINGS: TOTAL DIRECT CURRENT	RATINGS: D. C. RESISTANCE	RATINGS: INDUCTANCE @ CURRENT 1000 ⁰⁄₀₀	REPLACEMENT DATA: FIRESTONE PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L13	.280A	23Ω	.6H	56A393	C9041 ①	C-3098 ②	C-3238 ②	26C44 ②	C-33x ②

① Drill one new mtg. hole.

COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	FIRESTONE PART No.	REPLACEMENT DATA
K1	Sync Coupler	270MMF, 25MMF, 10000MMF, 330Ω, 2. 2Meg	49A046	Aerovox PA-533 Centralab PC-563 Sprague ST-3

RECTIFIERS

ITEM No.	RATING: CURRENT (Measured)	REPLACEMENT DATA: FIRESTONE PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	MALLORY PART No.	RADIO RECEPTOR PART No.	SARKES TARZAN PART No.
M1	.380A	27C338 ①	1023A ①	1N1007 ②	RS3508L ①	66260 ①	6GA3 ①	36GA ①
M2		27C338 ①	1218 ① ②		FT1 ① ②			

① Selenium type.
② Germanium type.
③ 2 required.

CRYSTAL DIODES

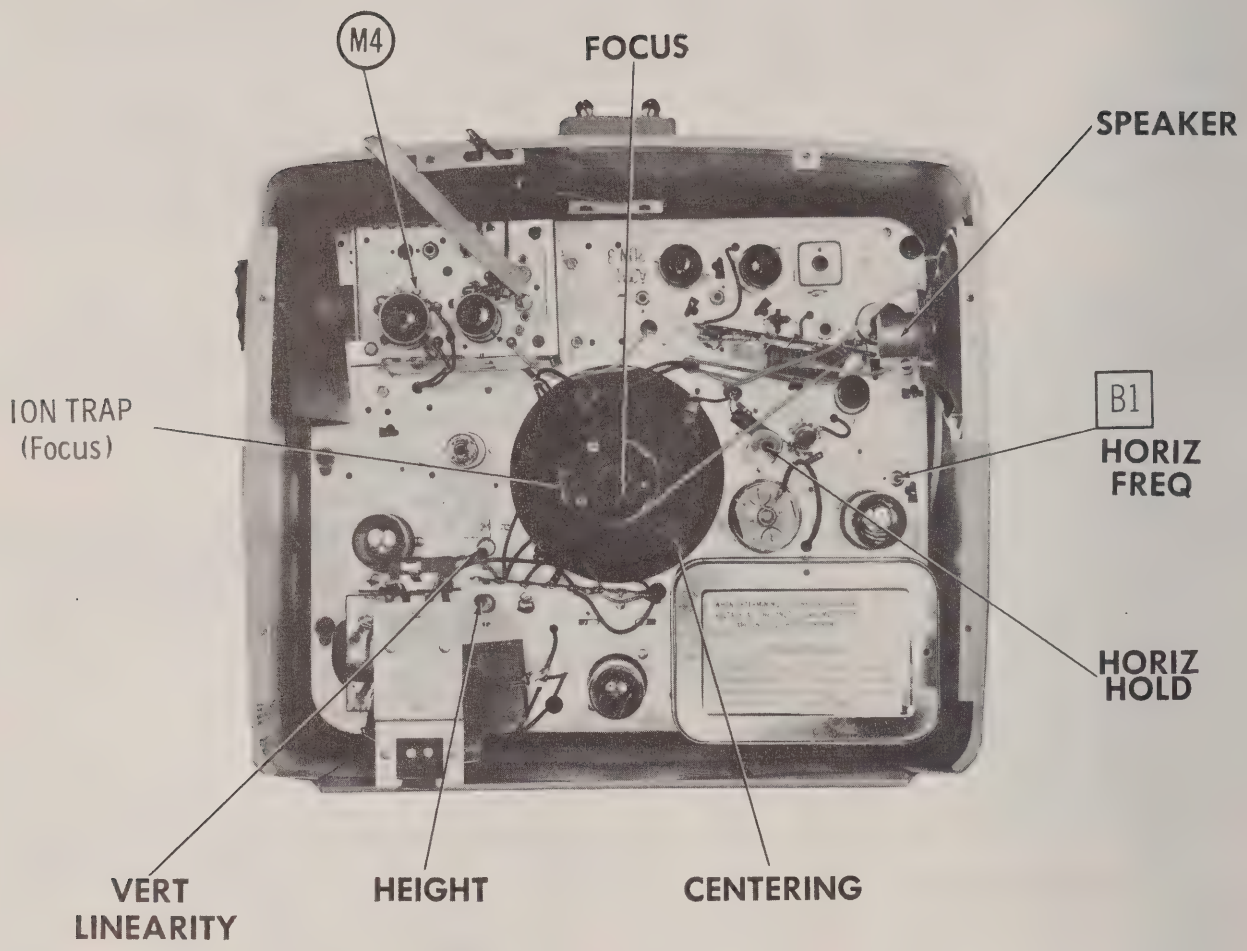
ITEM No.	CHRG. TYPE	REPLACEMENT DATA: FIRESTONE PART No.	SYLVANIA PART No.	NOTES
M3	1N60*	19C1060	1N60	Video Detector (Pigtail)

* A CK-706A or 1N295 may be used in this application

MISCELLANEOUS

ITEM No.	PART NAME	FIRESTONE PART No.	NOTES
M4	Tuner	1-3067	VHF
M5	Centering Device	21B24	
M6	Ion Trap	21B188	
	Safety Glass	[redacted]	
	Knob	15B1055	Control (4 used)
	Knob	15A1040	VHF Channel Selector
	Knob	15C1038	Fine Tuning
	Handle	41A60227	Complete Assembly
	Cabinet	66-1522	Desert Sand, beige and Newport Ivory
	Cabinet	66-1533	Tango Pink & Newport Ivory

FIRESTONE MODELS 13-G-208, 13-G-209 (Code 1999-6-A2010)



CABINET—REAR VIEW

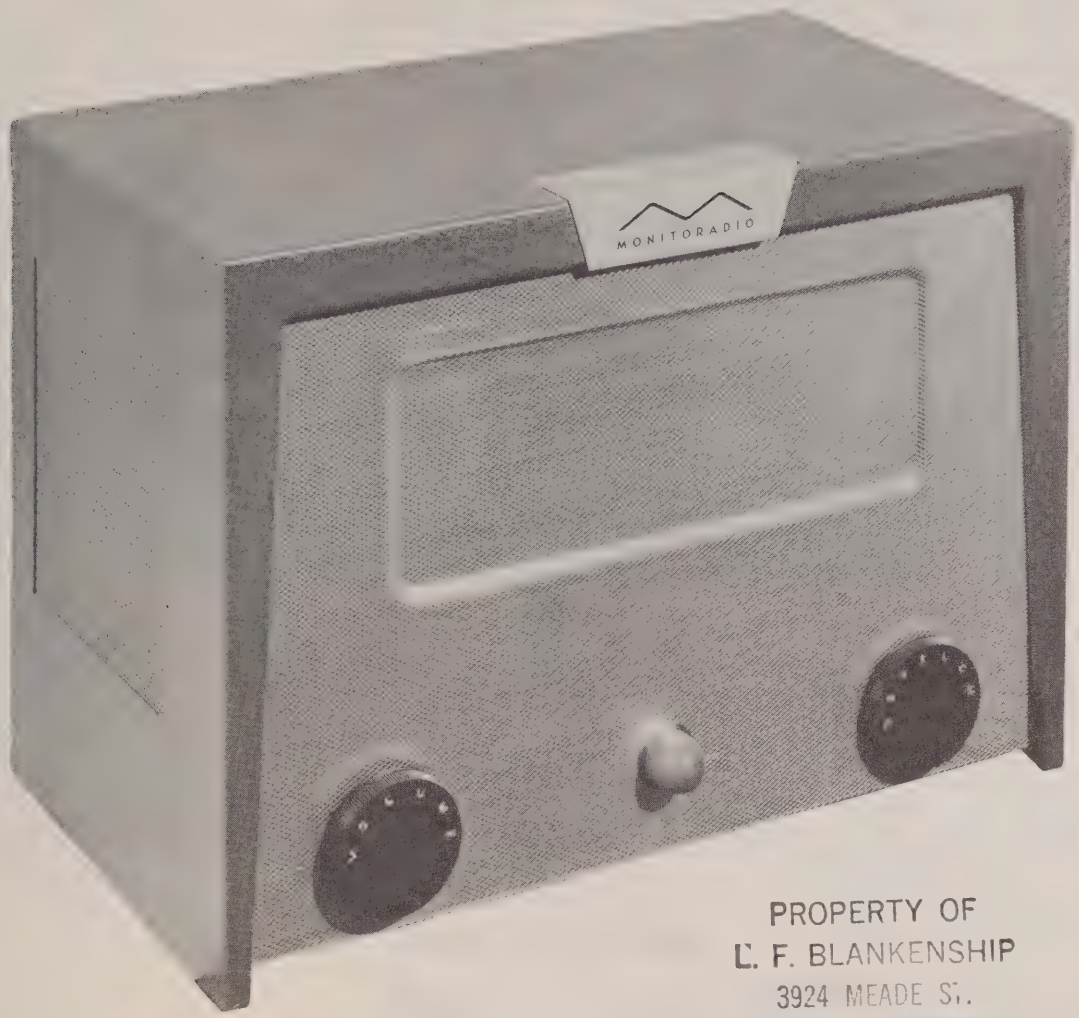
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

HORIZONTAL OSCILLATOR ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.
2. Set the horizontal hold control to its mid-range position and adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.
3. Check other stations and if necessary, retouch B1 for best sync action on all channels.

MONITORADIO MODEL MRC-10

MONITORADIO MODEL MRC-10



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MONITORADIO MODEL MRC-10

TRADE NAME	Monitoradio Model MRC-10
MANUFACTURER	Monitoradio Div., I.D.E.A., Inc., 7900 Pendleton Pike, Indianapolis 26, Indiana
TYPE SET	AC Operated Single Channel FM Receiver
TUBES (Nine)	6BC5 RF Amp., 6CB6 Crystal Osc., 6U8 Mixer-Freq. Multiplier, 6BJ6 1st IF Amp., 6BJ6 2nd Amp., 6AL5 Ratio Det., 12AX7 Squelch-AF Amp., 6AK6 Output, 6X4 Rectifier
POWER SUPPLY	105-125 Volts AC-60 Cycles RATING .35 Amp. @ 117 Volts AC (36 Watts)
FREQ. RANGE	147MC-174MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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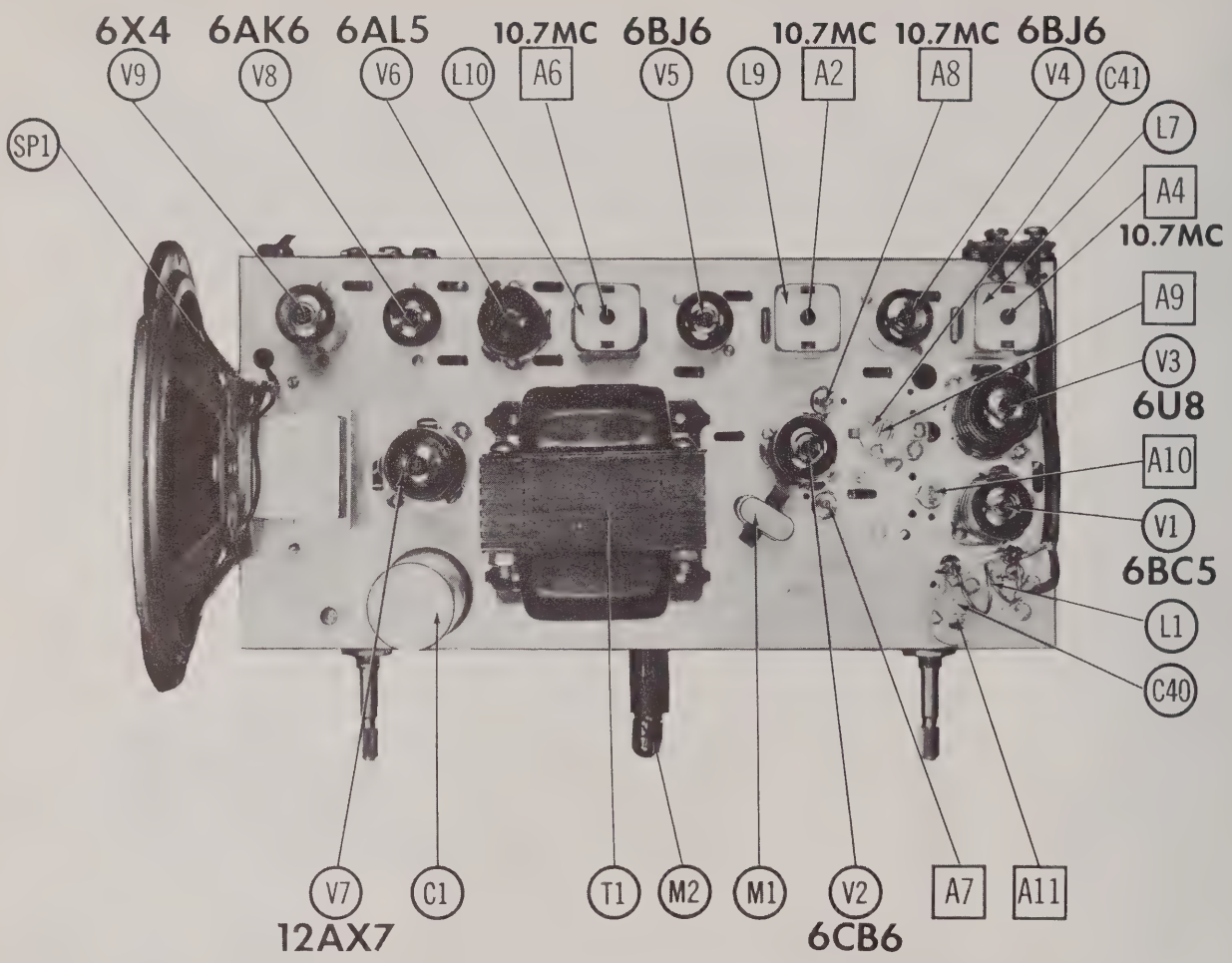
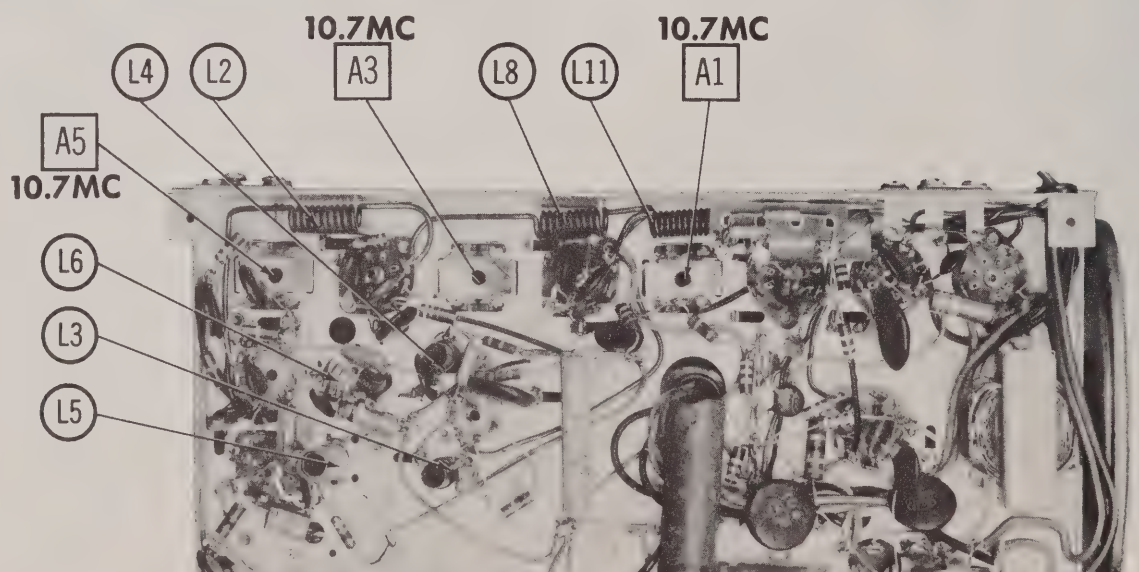


CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW- INDUCTOR AND ALIGNMENT IDENTIFICATION

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	RF Amplifier	6BC5	
V2	Crystal Oscillator	6CB6	
V3	Mixer-Freq. Multiplier	6U8	
V4	1st IF Amplifier	6BJ6	
V5	2nd IF Amplifier	6BJ6	

ITEM No.	USE	TYPE	NOTES
V6	Ratio-Detector	6AL5	
V7	Squelch-AF Amplifier	12AX7	
V8	Output	6AK6	
V9	Rectifier	6X4	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	Monitoradio PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	■40	250	300-082-8	AFH3-20	XCO732	FP321	TMT-20	T-090	TVL-3540
B	▲20	250							
C	20	25							
C2	2	50	300-109-1	PRS50V2	BBR2-50	TC302	TD-2-50	MT-0502	TVA-1301
C3	2	50	300-109-1	PRS50V2	BBR2-50	TC302	TD-2-50	MT-0502	TVA-1301

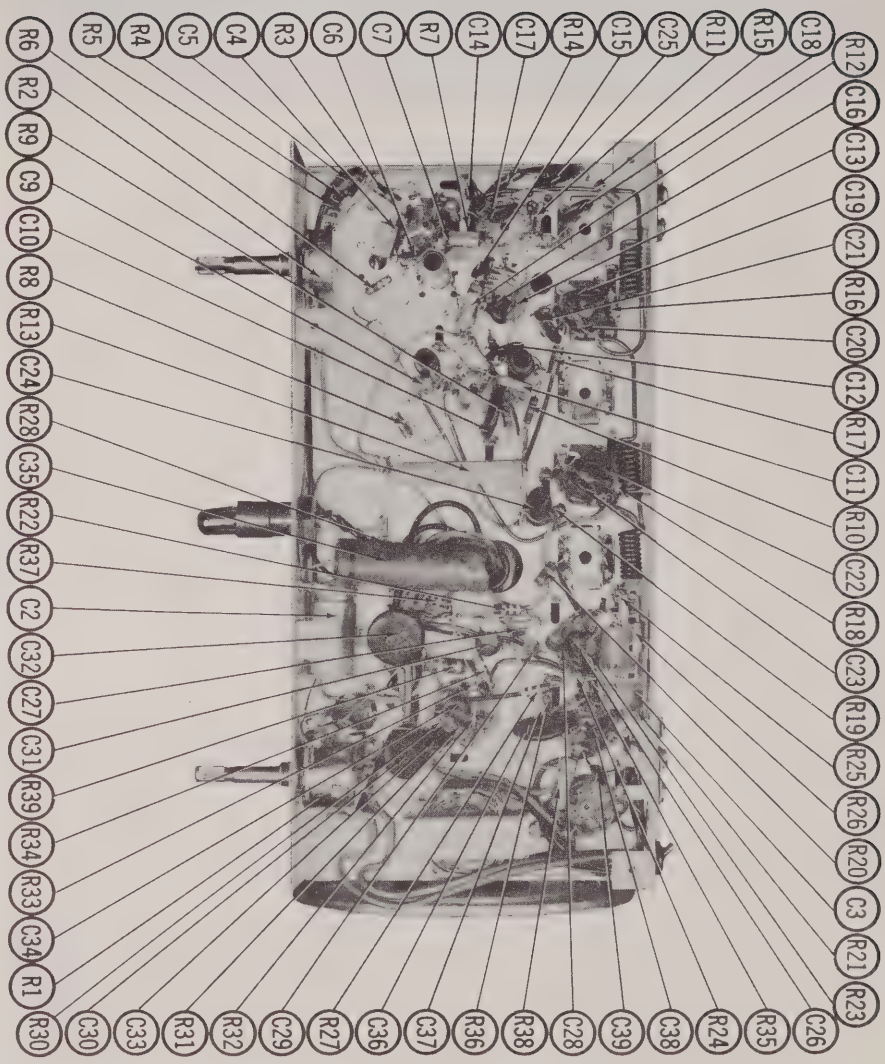
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Monitoradio PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	27			1469-000027	TCZ-27	22R5Q27	TCO-27		MS-427	5%
C5	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C6	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C7	15			1469-000015	TCZ-15	22R5Q15	TCO-15		MS-415	5%
C8	1.5			NPO-S11.5	TCZ-1R5	C10V15C	TCO-1.5	ZT-5515	5TCCB-V15	①
C9	27			1469-000027	TCZ-27	22R5Q27	TCO-27		MS-427	5%
C10	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C11	27			1469-000027	TCZ-27	22R5Q27	TCO-27		MS-427	5%
C12	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C13	27			1469-000027	TCZ-27	22R5Q27	TCO-27		MS-427	5%
C14	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C15	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C16	2000			BPD-002	DD-202	BYA6D2	ED-2000	DC-522	5HK-D2	②
C17	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC-521	5HK-D1	
C18	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C19	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C20	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C21	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C22	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C23	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C24	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C25	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C26	1000			BPD-001	DD-102	L10T33	ED-1000	DC521	5HK-D1	
C27	330			BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C28	330			BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C29	330			BPD-00033	DD-331	L10T33	ED-330	UC-5333	5GA-T33	
C30	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C31	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C32	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C33	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C34	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C35	.25	200		P288N-25		CUB2P25		GEM-2025	2TM-P25	
C36	10000			BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C37	270			BPD-00027	DD-271	L10T27	ED-270	UC-5327	5GA-T27	
C38	5000			BPD-005	DD-502	BYA10D5	ED-005	DC525	5HK-D5	
C39	1000			BPD-001	DD-102	BYA6D1	ED-1000	DC521	5HK-D1	
C40	3-13									N300
C41	3-14									N300

① Not used in some versions.
② Some versions may use two 1000MMF in this application.

CHASSIS—BOTTOM VIEW



ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Turn volume and squelch controls fully clockwise.
Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.001MFD	High side to pin 2 (grid) of 6U8 (V3). Low side to chassis.	10.7MC		DC probe to point Ⓐ. Common to chassis.	A1, A2, A3, A4, A5	Adjust for maximum deflection.
2.	"	"	"		DC probe to point Ⓑ. Common to point Ⓒ.	A6	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
3.	.001MFD	High side to pin 2 (grid) of 6U8 (V3). Low side to chassis.	10.7MC (±200KC Swp)		Vert. Amp. to point Ⓐ. Low side to chassis.	A1, A2, A3, A4, A5	Disconnect stabilizing capacitor C3. Adjust for curve of maximum amplitude and symmetry similar to Fig. 1.
4.	"	"	"		Vert. Amp. to point Ⓑ. Low side to chassis.	A6	Reconnect capacitor C3. Adjust A6 for maximum straightness of diagonal line with 10.7MC marker appearing midway between peaks, similar to Fig. 2.

RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
5.		Signal generator not used.			DC probe to point Ⓓ. Common to chassis.	A7	Adjust for maximum deflection.
6.		"			DC probe to point Ⓔ. Common to chassis.	A8	Adjust for maximum deflection.
7.	22Ω Carbon Resistor	High side of sig. gen. to antenna terminal #1. Low side to terminal #2.	Freq. of desired signal		DC probe to point Ⓐ. Common to chassis.	A9, A10, A11	Adjust for maximum deflection.

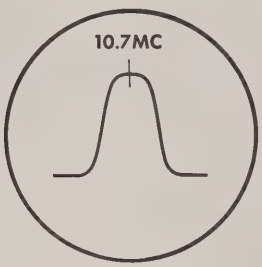


FIG. 1

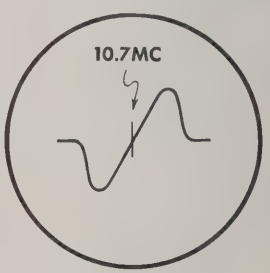
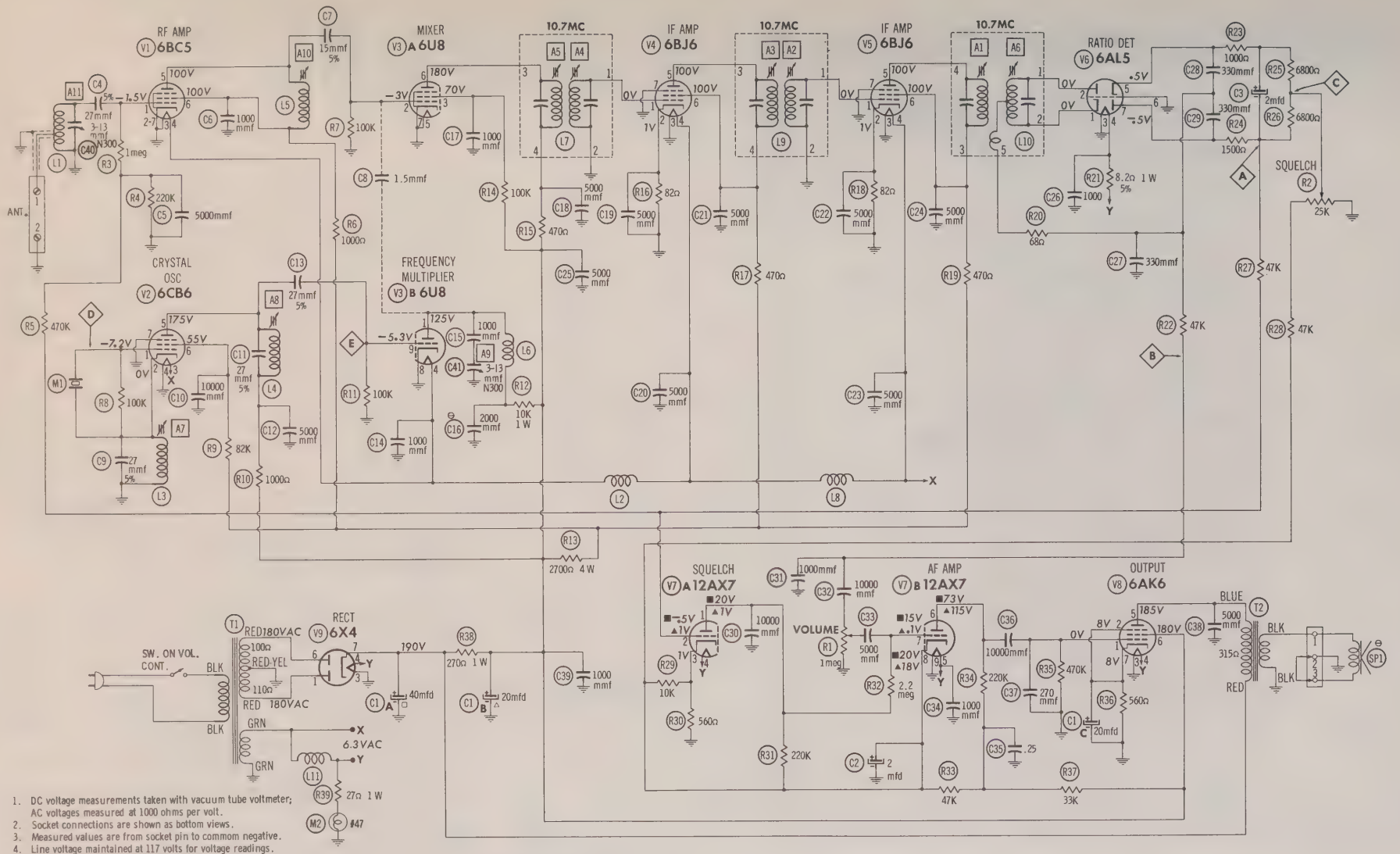


FIG. 2

RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BC5	1.2meg	0Ω	0Ω	.1Ω	*3.9K	*3.9K	0Ω		
V2	6CB6	100K	0Ω	.1Ω	0Ω	*1.2K	*85K	0Ω		
V3	6U8	*10K	100K	*100K	.1Ω	0Ω	*750Ω	0Ω	0Ω	100K
V4	6BJ6	.6Ω	82Ω	0Ω	.1Ω	*3.4K	*3.4K	0Ω		
V5	6BJ6	.6Ω	82Ω	0Ω	.1Ω	*3.4K	*3.4K	0Ω		
V6	6AL5	INF.	INF.	0Ω	3Ω	■7.8K ▲26K	0Ω	■8.2K ▲26K		
V7	12AX7	*330K	■54K ▲70K	560Ω	.1Ω	.1Ω	*220K	2.4meg	10K	0Ω
V8	6AK6	470K	560Ω	0Ω	.1Ω	*330Ω	*270Ω	560Ω		
V9	6X4	110Ω	INF.	0Ω	.1Ω	INF.	100Ω	20K(MIN)		

* MEASURED FROM PIN 7 OF V9.
■ SQUELCH CONTROL IN FULLY CLOCKWISE POSITION.
▲ SQUELCH CONTROL IN FULLY COUNTER-CLOCKWISE POSITION.



1. DC voltage measurements taken with vacuum tube voltmeter; AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to commom negative.
4. Line voltage maintained at 117 volts for voltage readings.
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6. Volume control at maximum, no signal applied for voltage measurements.

⊖ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Monitoradio PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1Meg	½	100-093-8	B-70	A47-1Meg-Z	Q13-137	U53	Volume
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-26	
R2A	25K	½	100-093-9	B-27	A47-25K-V	Q14-120	U28	Squelch
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Monitoradio PART No.	IRC PART No.	
R3	1Meg			BTS-1Meg	
R4	220K			BTS-220K	
R5	470K			BTS-470K	
R6	1000Ω			BTS-1000	
R7	100K			BTS-100K	
R8	100K			BTS-100K	
R9	82K			BTS-82K	
R10	1000Ω			BTS-1000	
R11	100K			BTS-100K	
R12	10K	1		BTA-10K	
R13	2700Ω	4			
R14	100K			BTS-100K	
R15	470Ω			BTS-470	
R16	82Ω			BTS-82	
R17	470Ω			BTS-470	
R18	82Ω			BTS-82	
R19	470Ω			BTS-470	
R20	68Ω			BTS-68	
R21	8.2Ω 5%	1			

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Monitoradio PART No.	IRC PART No.	
R22	47K			BTS-47K	
R23	1000Ω			BTS-1000	
R24	1500Ω			BTS-1500	
R25	6800Ω			BTS-6800	
R26	6800Ω			BTS-6800	
R27	47K			BTS-47K	
R28	47K			BTS-47K	
R29	10K			BTS-10K	
R30	560Ω			BTS-560	
R31	220K			BTS-220K	
R32	2.2Meg			BTS-2.2Meg	
R33	47K			BTS-47K	
R34	220K			BTS-220K	
R35	470K			BTS-470K	
R36	560Ω			BTS-560	
R37	33K			BTS-33K	
R38	270Ω	1		BTA-270	
R39	27Ω	1		BTA-27	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	Monitoradio PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117V @ .35A	375VCT @ .052A	6.3VAC @ 2.5A		500-160-3				22R28①	

① Use Universal Mtg. Brackets

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	Monitoradio PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	8500Ω	3-4Ω	300-240-1	Z1116	A-2927①	A-8114	24S52	S-7X	① Drill new mtg. hole.

SPEAKER

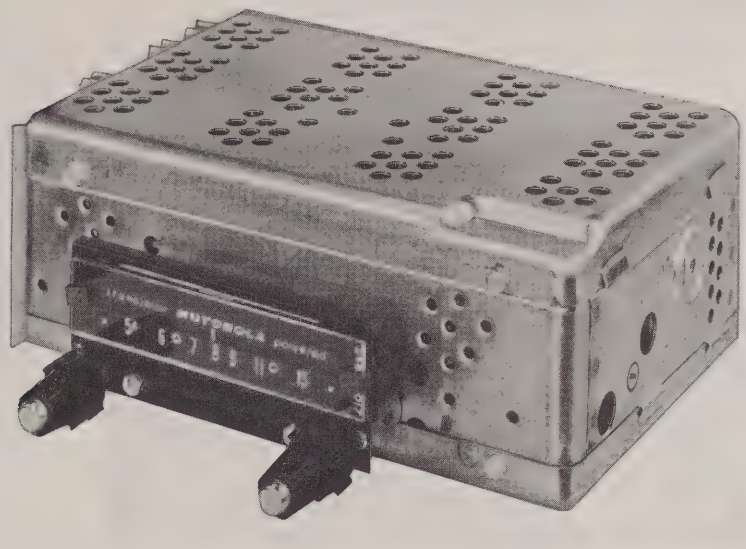
ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	Monitoradio PART No.	QUAM PART No.	
SP1	5"	PM	3-4Ω	750B21 ①	5A1	① Alternate Part #300-071-3

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		Monitoradio PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Antenna Coil	300-529-3				
L2	Fil. Choke	100-710-3	19-1000	BC-561	4602	1.1 Microhenry
L3	Crystal Osc. Cathode	300-307-1				
L4	Crystal Osc. Plate	100-716				
L5	RF Coil	100-883				
L6	Osc. Coil	300-459-1				
L7	Input IF	300-077-2	16-3487	FM-254	1463	
L8	Fil. Choke	100-710-2	19-1000	BC-561	4602	1.1 Microhenry
L9	Output IF	300-077-2	16-3487	FM-254	1463	
L10	Ratio Det.	500-314	17-3498	FM-255	6205	
L11	Fil. Choke	100-710-1	19-1000	BC-561	4602	1.1 Microhenry

MISCELLANEOUS

ITEM No.	PART NAME	Monitoradio PART No.	NOTES
M1	Crystal	300-306	(Special Order Only - Specify Frequency And Quantity)
M2	Dial Light		#47
	Knob	300-531-2	On-Off-Volume
	Knob	300-531-3	Squelch



PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

MOTOROLA
MODEL 7MX

TRADE NAME	Motorola Model 7MX
MANUFACTURER	Motorola Inc. 4545 W. Augusta Blvd., Chicago 51, Ill.
TYPE SET	Battery Operated Universal Type AM Automobile Receiver With Transistorized Output
TUBES (Five)	Types 12DE8 Overload Limiter-RF Amplifier, 12AD6 Converter, 12AF6 IF Amplifier, 12F8 Det.-AVC-AF Amp., 12K5 Driver
POWER SUPPLY	12 Volt Storage Battery — RATING 2 Amp. @ 12.6 Volts DC
TUNING RANGE—BROADCAST	540 - 1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1	.1MFD	High side to pin 7 (grid) of 12AD6 (V2). Low side to chassis.	455KC (400~Mod.)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum output.
2	Fig. 1	Thru dummy to Antenna receptacle	1610KC	"	"	A5, A6, A7	"
	Note: Following steps not necessary unless tuner has been tampered with or replacement of associated components has been made. Remove dial scale mounting assembly and back tuner cores approximately 1" out of coils.						
3	Fig. 1	Thru dummy to Antenna receptacle	1610KC	High frequency end stop	Across voice coil	A5, A6 A7	Adjust for maximum output.
4	"	"	1200KC	Adjust carriage 9/32" from high freq. end stop.	"	A8, A9, A10	Adjust A8, A9 and A10 for maximum output. (Motorola alignment tool Part #66A76268 may be used.)
5	"	"	1610KC	High frequency end stop.	"	A5, A6,	Adjust for maximum output. Repeat step 4 & 5 until no further improvement is noted making step 5 the last adjustment.
	With radio installed in car and antenna fully extended, tune in a weak station near 1400KC and adjust A7 for maximum volume.						

DIAL POINTER ADJUSTMENT

With tuner set at high frequency end stop, adjust dial pointer to coincide with calibration dot at extreme right on dial face.

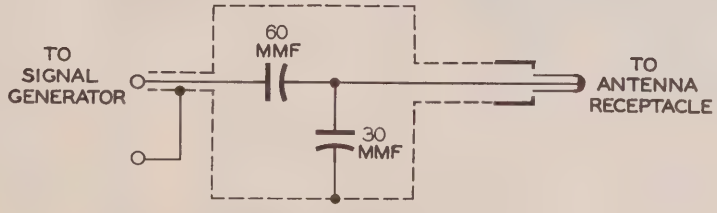


FIG. 1

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Overload Limiter- RF Amp.	12DE8	
V2	Converter	12AD6	
V3	IF Amplifier	12AF6	
V4	Det. -AVC-AF Amp.	12F8	
V5	Driver	12K5	

TRANSISTOR

ITEM No.	USE	TYPE	NOTES
X1	Output	2N178	Note 1

Note 1. Some versions use 2N176 (Part # 48C124246)

ELECTROLYTIC CAPACITOR

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▲500	16	23B540699	AFH2-02-10	B0045	WP200.5			R2299 *
B	■100	16							

* Non catalog item

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	90		21K533453							
C3	20-180		20K540928							
C4	10		21K125518	BPD-00001	DD-100	L10Q1	ED-10	UC-541	5GA-Q1	
C5	.05	200	8B120842	BPD-05	DF-503	CUB2S5		GEM-415		
C6A	7.5-75		20B540657							
B	4.7									
C	370-450									
D	47									
C7	.05	200	8B120842	BPD-05		BC2S47J		ACE615	2SE-S47	
C8	10000		21R482726	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C9	.05	200	8R121005	BPD-05		BC2S47J		ACE615	2SE-S47	
C10	.1	100	8K124891	P288N-1		BC2P1J		ACE601	2SE-P10	
C11	.1	200	8R121573	P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C12	.5	100	8K121666	P288N-5		CUB2P5		GEM-205	2TM-P5	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	18B540768	F1-41			UE1474S	Tone
B	1Meg	½		R2-56				Volume, Tap@ 500K
C	Switch			KB-1				
R2	210Ω	1	18A540698					Emitter Bias (Wirewound)

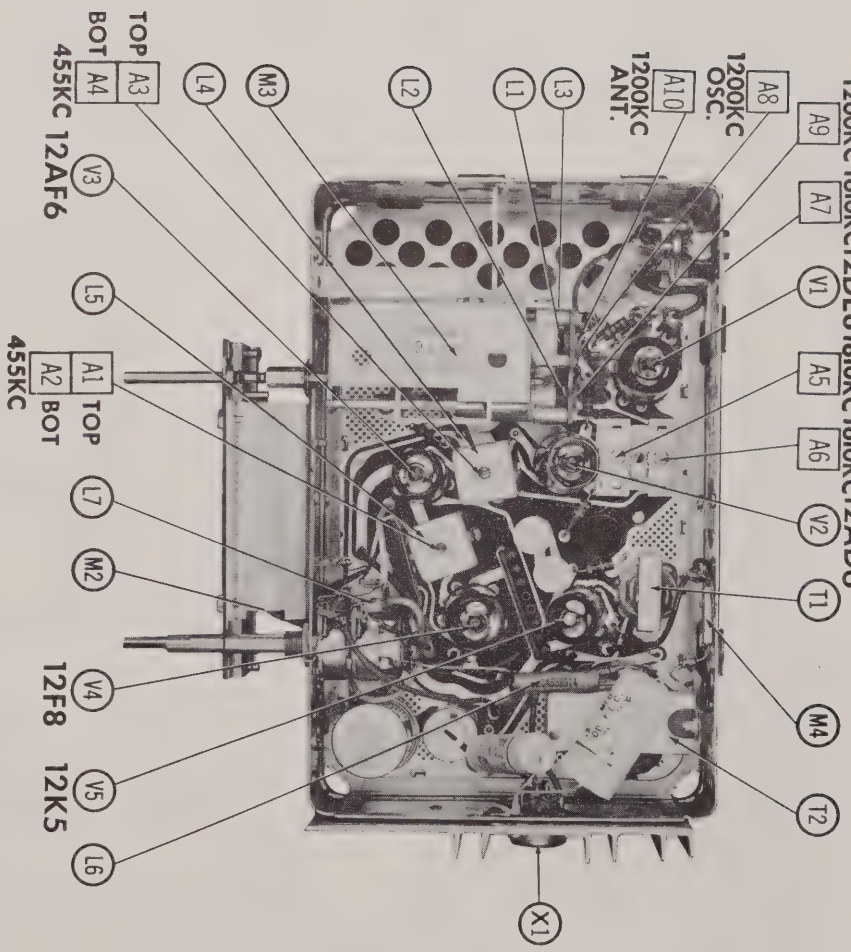
RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R3	1.5Meg		6R3966	BTS-1.5Meg	
R4	1Meg		6R6046	BTS-1Meg	
R5	47K		6R6048	BTS-47K	
R6	36Meg		6K541294		
R7	470K		6R6032	BTS-470K	
R8	33K		6R6012	BTS-33K	
R9	270Ω		6R6432	BTS-270	
R10	330K		6R6014	BTS-330K	
R11	56Ω		6R5614	BTS-56	
R12	18Ω		6R2031	BTS-18	
R13	5-6Ω 5%	1	6A488139		
R14			6K540634		Note 1.

Note 1. Special temperature comp. resistor, 10Ω@ 25°C

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (DRIVER)

ITEM No.	Turns Ratio		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	6.5 : 1		25B540523						

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.1	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	31.5Ω	3-4Ω	25C540659						
	Turns Ratio								
	PRI.	SEC.2							
	1 : 1								

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	6"X9"	PM	3-4Ω	50C541101	69A2	

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		MOTOROLA PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Antenna Coil	24C535458				Part of Tuner M3
L2	RF Coil	24C535458				Part of Tuner M3
L3	Osc. Coil	24C540969				Part of Tuner M3
L4	Input IF	24K541029	16-6780	BC-356	13-PC1	
L5	Output IF	24C541028			13-PC6	
L6	"A" Lead Choke	24A538914				10.3 Microhenries

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA					
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L7	.600A	.7Ω	12Millihenries	25B540522					

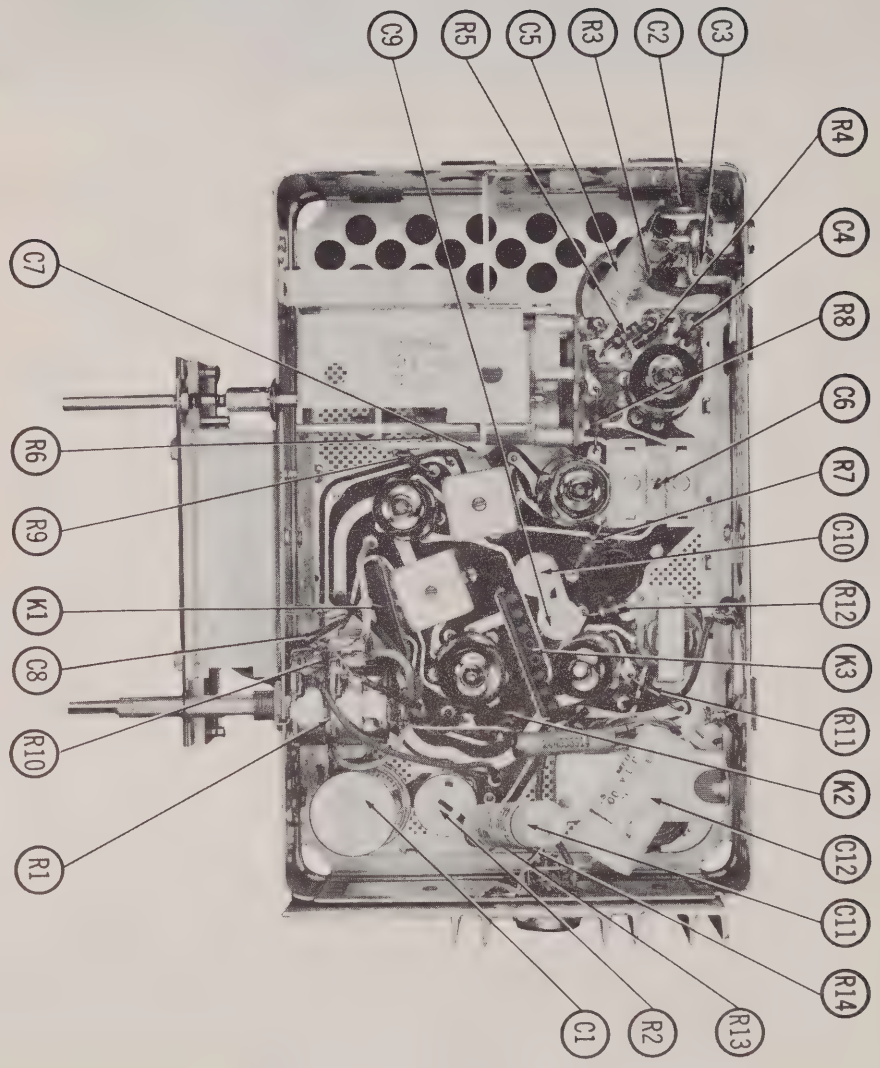
COMPONENT COMBINATIONS

ITEM No.	USE	DESCRIPTION	MOTOROLA PART No.	REPLACEMENT DATA
K1	Detector-AVC Network	27 MMF, 6.8Meg, 1Meg, 12Meg, 3.3Meg	51B540765	Erie 706-03
K2	Audio Coupling Network	10000 MMF, 3.3Meg	51B540764	Erie 703
K3	Audio Coupling Network	10000 MMF, 4000 MMF, 10K, 820K, 2.2Meg, 220K, 82Ω	51B540766	Erie 708-03

FUSE

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			MOTOROLA PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	SFE	9A	65R16248	1V541705	307009. (SFE-9A)	155009	SFE9	HRH

CHASSIS— TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	MOTOROLA PART No.	NOTES
M2	Pilot Light	65R533821	#1891
M3	Tuner	77D540970	(MT-211) Complete Ass'y. Includes Coils L1, L2, L3 & Mounting Plate (Part #1V540976)
M4	Spark Plate	21A522033	300 MMF
	Printed Panel	84B540767	(Include Letter Following Part Number)

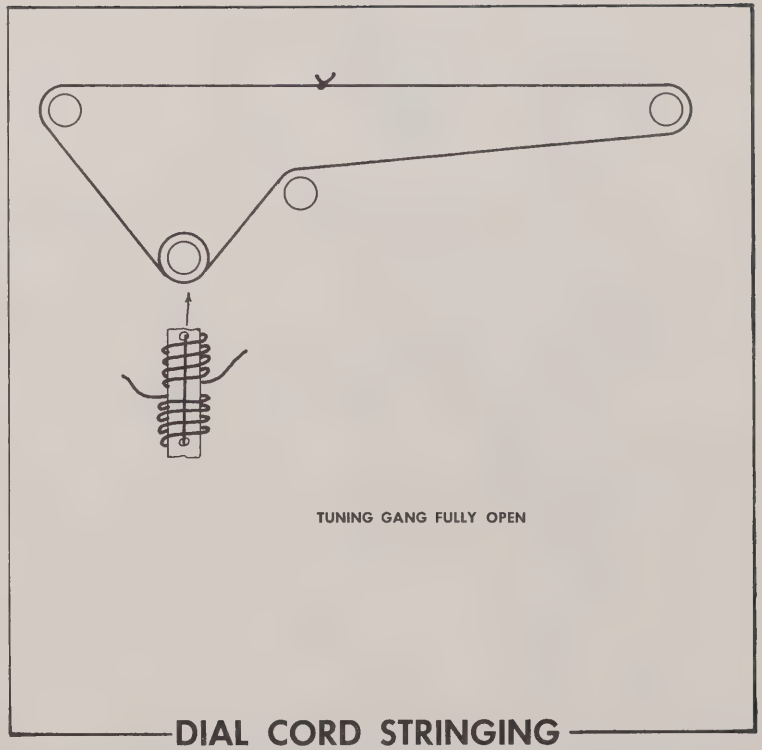
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

NAME	PART NO.	DESCRIPTION
Knob	36B540048	ON-OFF-Volume, Tuning
Knob	36B540050	Tone
Knob	36K540051	Dummy
Dial Scale	1V533843	
Cover	15D540769	Bottom (Tube Side)
Cover	15K540772	Top (Wiring Side)
Pointer	1K532594	Dial

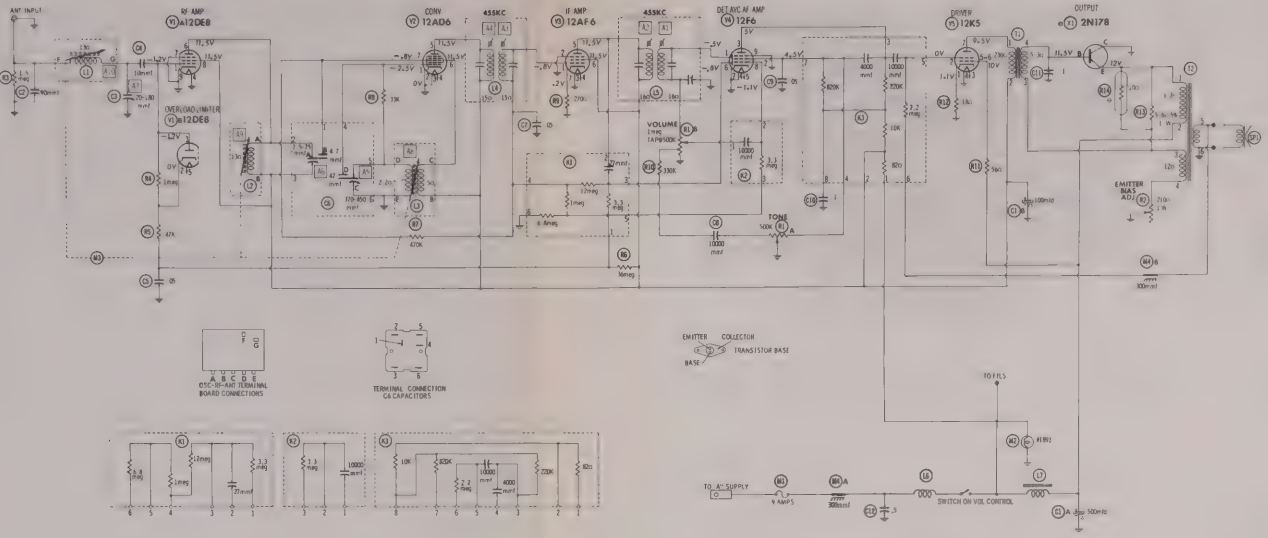
EMITTER CURRENT ADJUSTMENT

Connect a milliammeter in series with the emitter terminal of the transistor (X1). The internal resistance of the meter should not exceed .5Ω. Connect a power source of 14 volts DC to the receiver and allow a warm-up period of 15 minutes. Adjust R2 for a meter reading of 500MA.
(Alternate Method)
Remove the transistor (X1) from its socket. Connect an ammeter (0-3 Amp.) in series with the receiver "A" lead. The internal resistance of the meter should not exceed .02Ω. Connect a power source of 14 volts DC to the receiver and allow a warm-up period of 15 minutes. Accurately measure the current, turn the receiver off and reconnect the transistor. Be certain that the mounting screws are tightened securely. Turn on the receiver and adjust R2 for an increase of 500MA in current drain.



TUNING GANG FULLY OPEN

DIAL CORD STRINGING



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12DE8	20 Meg	19.8Meg	20 Meg	0Ω	1Ω	1.95Ω	2Ω	1.82Ω	0Ω
V2	12AD6	33K	0Ω	0Ω	1Ω	1.95Ω	1.82Ω	8.2Meg		
V3	12AF6	7.8Meg	0Ω	1Ω	0Ω	1.95Ω	1.80Ω	270Ω		
V4	12F8	1Meg	1.83K	1.23K	0Ω	1Ω	19.8Meg	0Ω	10Meg	0Ω
V5	12K5	1Ω	2.2Meg	1Ω	0Ω	1.55Ω	1.55Ω	1.310Ω		

† MEASURED FROM JUNCTION OF ON-OFF SW AND L7

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt
2. Socket connections shown as bottom views
3. Measured values are from socket pin to common negative
4. Battery voltage maintained at 12.6 volts for voltage readings
5. Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings
6. Volume control at maximum, no signal applied for voltage measurements

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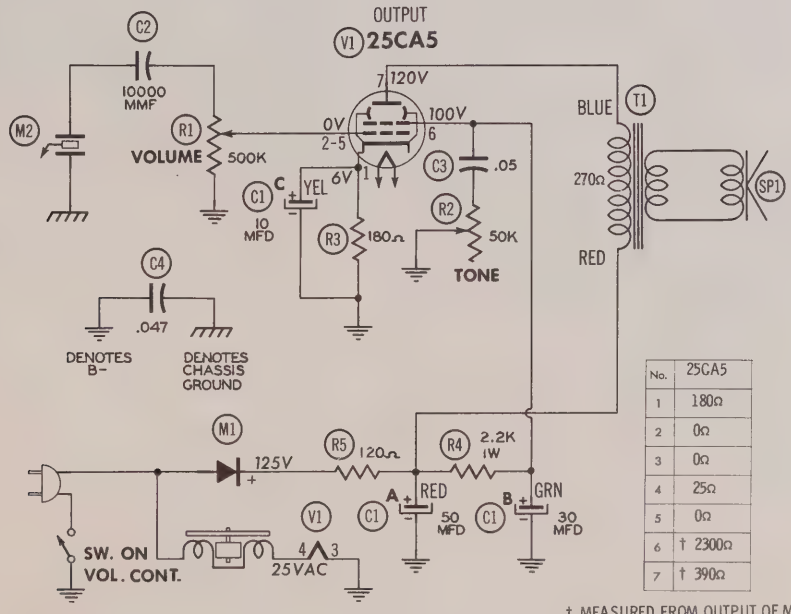
MOTOROLA
MODELS 26F1, 26F2 (Ch. HS-491)

PROPERTY OF
L. F. BLANKENSHIP
3924 [illegible] ST.
DENVER, COLO [illegible]

MOTOROLA
MODELS 26F1, 26F2 (Ch. HS-491)

TRADE NAME	Motorola Models 26F1, 26F2 (Ch. HS-491)	
MANUFACTURER	Motorola Inc., 4545 Augusta Blvd., Chicago 51, Illinois	
TYPE SET	AC Operated Phono Amplifier With 3 Speed Manual Record Player	
TUBES (One)	Type 25CA5 Output	
POWER SUPPLY	110-120 Volts AC-60 Cycles	RATING .34 Amp. @ 117 Volts AC



No.	25CA5
1	180Ω
2	0Ω
3	0Ω
4	25Ω
5	0Ω
6	† 2300Ω
7	† 390Ω

† MEASURED FROM OUTPUT OF M1

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PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Output	25CA5	

ITEM No.	USE	TYPE	NOTES

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	MOTOROLA PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	50	150	23K634545	PRS150V50-3010	BBRT5315C	TCT3107	TDL-532	FMT-327	TVA-3430
B	30	150							
C	10	10							

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	MOTOROLA PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C2	10000		21R121946	DI-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C3	.05	200	8R121005	BPD-05	DF-503	CUB2S5		GEM-415	2TM-S5	
C4	.047	400	8K490232	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	MOTOROLA PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	18B634543	AB-60	A47-500K-Z	Q13-133	U-48	Volume
B	Shaft			AK-8	RS-3/16	NQ	DS-37	
C	Switch			KB-1	SWE-12	76-1	US-26	
R2A	50K	½	18A634542	AB-32	A47-50K-Z	Q13-123	U-33	Tone
B	Shaft			AK-8	RS-3/16	NQ	DS-37	

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R3	180Ω		6R5660	BTS-180	
R4	2200Ω	1	6R6146	BTA-2200	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	MOTOROLA PART No.	IRC PART No.	
R5	120Ω		6R5551	BTS-120	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	MOTOROLA PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T1	4350Ω	3-4Ω	25B634544	Z1000 ①	A-3026	A3877 ①	22S46 ①	S-6X	① Drill new mtg. hole.

SPEAKER

ITEM No.	TYPE			REPLACEMENT DATA		NOTES
	SIZE	FIELD	V. C. IMP.	MOTOROLA PART No.	QUAM PART No.	
SP1	4"	PM	3-4Ω	50D634563-A	4A07	

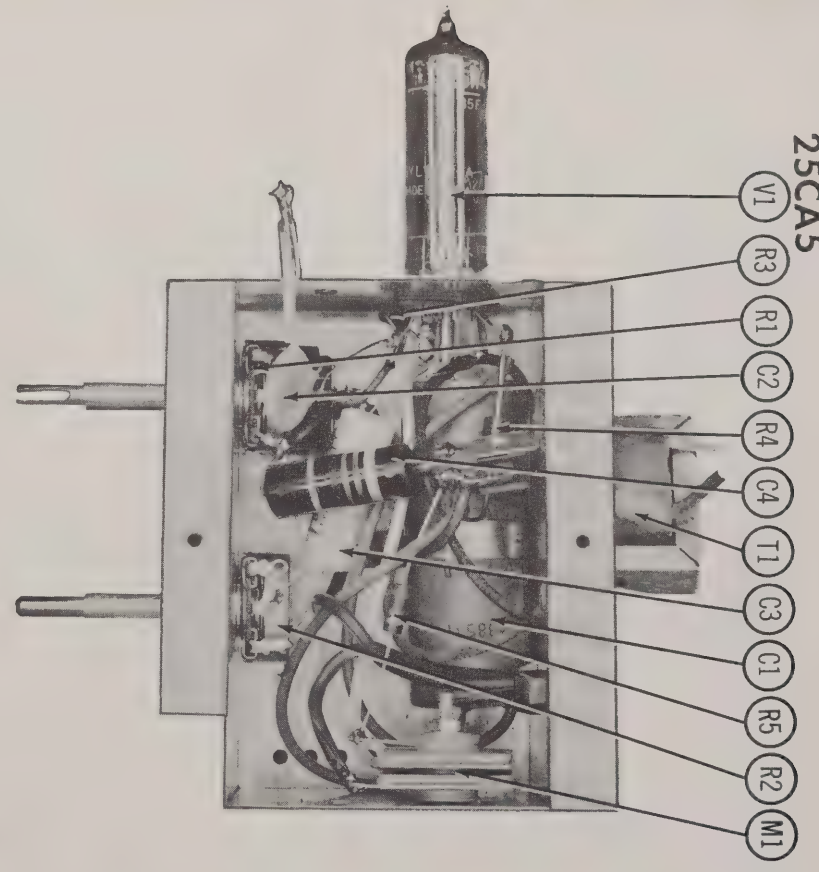
SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA					NOTES
	CURRENT (Measured)	MOTOROLA PART No.	FEDERAL PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	
M1	.040A	48K791092	1263A	RS050	6S65	65	

PHONO CARTRIDGE

ITEM No.	REPLACEMENT DATA					REMARKS
	MOTOROLA PART No.	ASTATIC PART No.		ELECTRO-VOICE PART No.		
		CARTRIDGE	NEEDLE	CARTRIDGE	MOUNT	
M2	59C634613			56	PT-1	

CHASSIS—BOTTOM VIEW



PHONO NEEDLE

(FOR REPLACEMENT IN ORIGINAL EQUIPMENT CARTRIDGE)

ITEM No.	REPLACEMENT DATA			REMARKS
	MOTOROLA PART No.	JENSEN PART No.	WALCO PART No.	
M3	47K632856	* JP-35 or † JPS-35 or ♦† JPS-35SD or ♦ JPS-35D	† W-33TPS or ♦† W-33DS or ♦ W-33TPD	* Metal † Jewel ♦ Diamond

NEWCOMB
MODEL CO-1012

NEWCOMB
MODEL CO-1012

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

TRADE NAME	Newcomb Model CO-1012
MANUFACTURER	Newcomb Audio Products Co., 6824 Lexington Ave., Hollywood 38, California
TYPE SET	AC Operated 7 Channel 12 Watt Audio Amplifier
TUBES (Six)	Types 12AX7 Mic-Phono Preamplifier, 6AV6 AF Amplifier, 12AX7 AF Amp.-Phase Inv. (2) 6V6GT Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycles RATING .64 Amp. @ 117 Volts AC (68 Watts)

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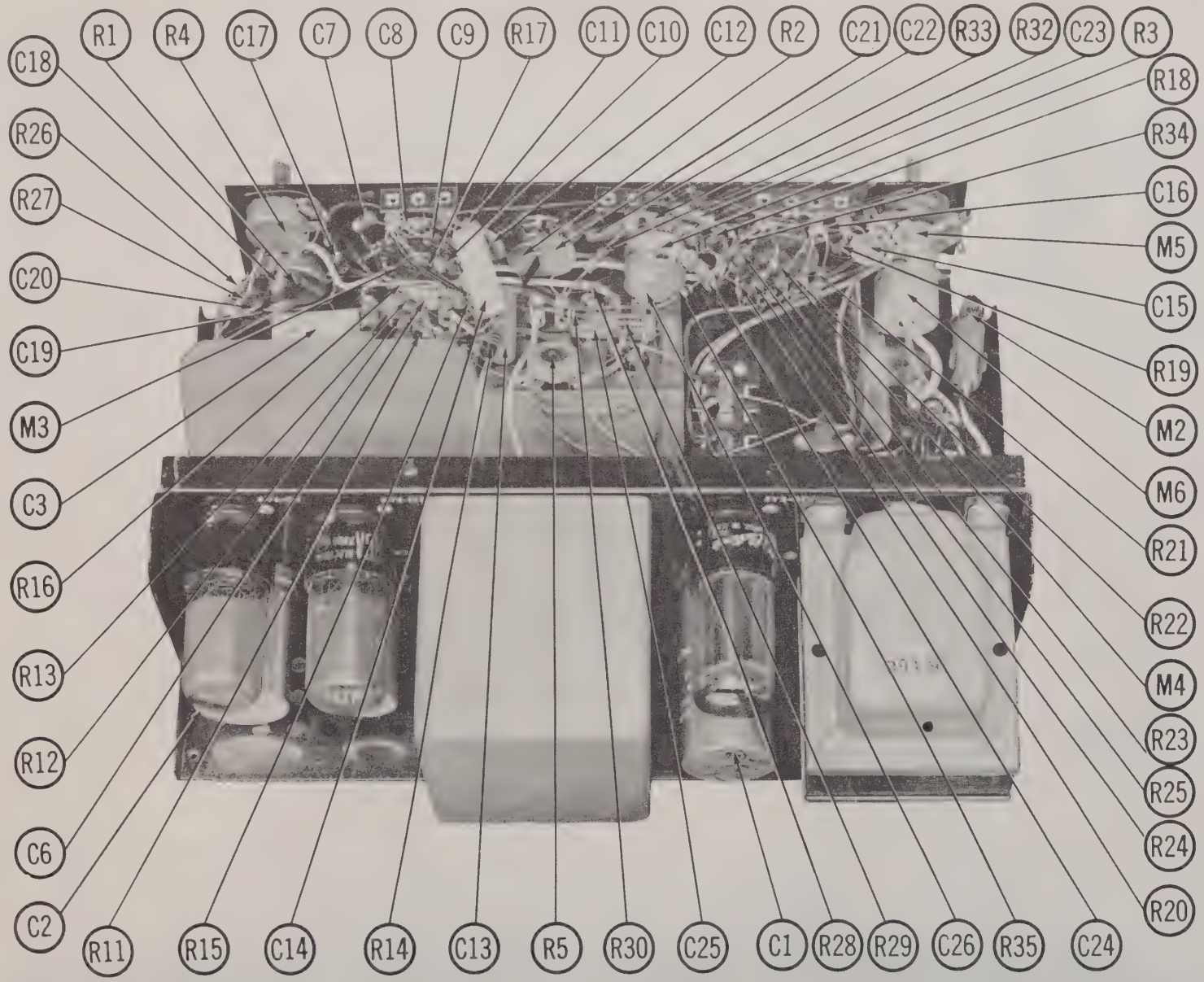


CHASSIS TOP VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	Mic-Phono Preamplifier	12AX7	
V2	AF Amplifier	6AV6	
V3	AF Amplifier-Phase Inv.	12AX7	

ITEM No.	USE	TYPE	NOTES
V4	Output	6V6GT	
V5	Output	6V6GT	
V6	Rectifier	5Y3GT	

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP.	VOLT.	NEWCOMB PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1A	▰60	500	CE-33	AFH3-49	BO520 BR3050	FP284 TC82	TMD-92 TD-20-500	Q-075	TVL-3839
B	▲10	475							
C2A	▰20	475	CE-30			FP474 TC36	TMQ-19 TD-25-50	Q-070 FM-0525	R2405 *
B	▲10	475							
C	■10	475							
D	25	50							
C3	4	450	CE-1	PRS450V4	BR445	TC70	TD-4-450	FM-4504	TVA-1702

* Non Catalog Item.

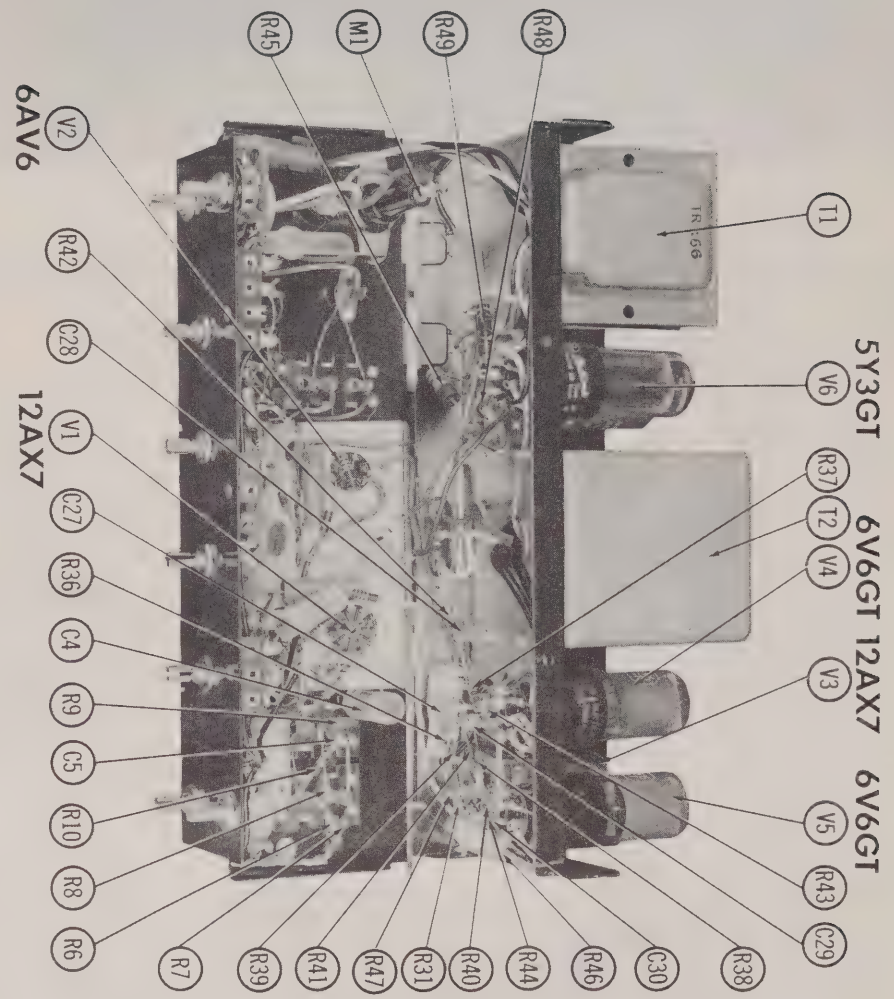
FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	NEWCOMB PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C4	.047	600	CP-49	BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	
C5	100		CM-14	SI-100	D6-101	LT6T1	GP-100	UC-531	5GA-T1	
C6	.047	600	CP-49	BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	Note 1
C7	47		CM-3	SI-47	D6-470	LT6Q47	GP-47	UC-5447	5GA-Q47	Note 2
C8	100		CM-14	SI-100	D6-101	LT6T1	GP-100	UC-531	5GA-T1	Note 3
C9	250		CM-22	BPD-00025	DD-251	L10T25	ED-250	UC-5325	5GA-T25	
C10	300		CM-15	SI-300	D6-301	LT6T3	GP-300	UC-533	5GA-T3	
C11	1000		CM-38	SI-1000	D6-102	LT6D1	GP-1000	DC521	5HK-D1	
C12	1600		CM-52	BPD-0015	DD-162	BYA10D15	GP-1500	UC-5215	5HK-D15	
C13	.01	600	CP-45	BPD-01	DD-103	CUB6S1	GP-10000	GEM-611	6TM-S1	
C14	.022	600	CP-47	BPD-02	DF-203	CUB6S22	ED-02	GEM-6122	6TM-S22	
C15	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C16	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C17	100		CM-14	SI-100	D6-101	LT6T1	GP-100	UC-531	5GA-T1	
C18	47		CM-3	SI-47	D6-470	LT6Q47	GP-47	UC-5447	5GA-Q47	
C19	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C20	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C21	10000		CM-32	BPD-01	DD-103	BYA6S1	ED-01	DC511	5HK-S1	
C22	1000		CM-38	SI-1000	D6-102	LT6D1	GP-1000	DC521	5HK-D1	
C23	470		CM-25	SI-470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
C24	470		CM-25	SI-470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
C25	.01	600	CP-45	BPD-01	DD-103	CUB6S1	GP-10000	GEM-611	6TM-S1	
C26	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C27	.047	600	CP-49	BPD-05	DF-503	CUB6S47		GEM-6147	6TM-S47	
C28	30		CM-16	SI-30		L10Q3	ED-30		5GA-Q3	
C29	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	
C30	20000		CM-35	BPD-02	DD-203	BYB6S2	ED-02		5HK-S2	

Note 1. Some versions may use .1 MFD @ 400V in this application.
Note 2. Some versions may use 100 MMF in this application.
Note 3. Some versions may use 150 MMF in this application.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	NEWCOMB PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	500K	½	RV-71-K	ABT-160			UDT-285	Loudness, Tap ⓐ 150K & 300K
B	Shaft			AK-4			Not Req.	
R2A	2Meg	½	RV-59-K		A47F3-2Meg	Q18-139X	UT-451	Treble, Tap ⓐ 1.2Meg
B	Shaft				KSS-3	Not Req.	Not Req.	
R3A	5Meg	½	RV-57-K					Bass
B	5Meg							Bass
R4A	500K	½	RV-86-K	B-59	A47-500K-S	Q11-133	U50	Level
B	Shaft			Not Req.	KSS-3	Not Req.	Not Req.	
R5	100Ω	2	RV-75					Hum Balance (Wire Wound)

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R6	56K		RR-25	BTS-56K	
R7	5600Ω		RR-15	BTS-5600	
R8	22K		RR-21	BTS-22K	
R9	180K		RR-29	BTS-180K	
R10	100K		RR-27	BTS-100K	
R11	18Meg		RR-140	BTS-18Meg	
R12	270K		RR-31	BTS-270K	
R13	220K		RR-30	BTS-220K	
R14	18Meg		RR-140	BTS-18Meg	
R15	270K		RR-31	BTS-270K	
R16	56K		RR-25	BTS-56K	
R17	470K		RR-33	BTS-470K	
R18	3.3Meg		RR-42	BTS-3.3Meg	
R19	180K		RR-29	BTS-180K	
R20	1.5Meg		RR-39	BTS-1.5Meg	
R21	180K		RR-29	BTS-180K	
R22	470K		RR-33	BTS-470K	
R23	330K		RR-32	BTS-330K	
R24	560K		RR-34	BTS-560K	
R25	1Meg		RR-37	BTS-1Meg	
R26	10K		RR-18	BTS-10K	
R27	33K		RR-23	BTS-33K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	NEWCOMB PART No.	IRC PART No.	
R28	120K		RR-28	BTS-120K	
R29	18Meg		RR-140	BTS-18Meg	
R30	100K		RR-27	BTS-100K	
R31	27K		RR-22	BTS-27K	
R32	330K		RR-32	BTS-330K	
R33	330K		RR-32	BTS-330K	
R34	560K		RR-34	BTS-560K	
R35	100K		RR-27	BTS-100K	
R36	100K 5%		RR-50	BTS-100K 5%	
R37	4700Ω		RR-14	BTS-4700	
R38	560K		RR-34	BTS-560K	
R39	100K 5%		RR-50	BTS-100K 5%	
R40	100K 5%		RR-50	BTS-100K 5%	
R41	5600Ω		RR-15	BTS-5600Ω	
R42	22K		RR-21	BTS-22K	
R43	560K		RR-34	BTS-560K	
R44	560K		RR-34	BTS-560K	
R45	1200Ω	2	RR-146	BTB-1200	
R46	300Ω	5		PW7-300	Note 1
R47	27K		RR-22	BTS-27K	
R48	27K		RR-22	BTS-27K	
R49	6.8Ω	1	RR-149		

Note #1. 250Ω 5 W Used in Some Versions (Part #RR-94).

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA					
	PRI.	SEC. 1	SEC. 2	SEC. 3	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
T1	117VAC ⓐ .64A	690VCT ⓐ .078A	5VAC ⓐ 2A	6.3VAC ⓐ 1.7A	TR-166	P9310 ①		PC8409 ①	24R02U ①	

① Tape Center Tap On 6.3V Winding.

TRANSFORMER (AUDIO OUTPUT)

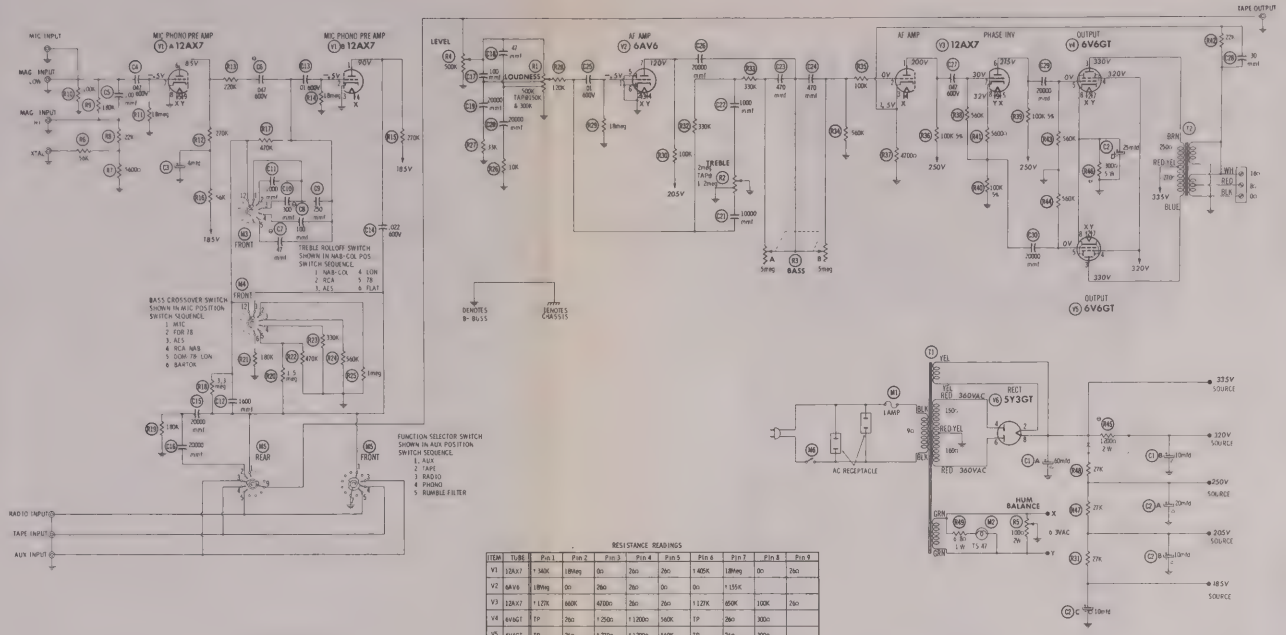
ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	NEWCOMB PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T2	7300Ω CT	16Ω Tap ⓐ 8Ω	TR-178						

FUSE

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			NEWCOMB PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG Slo/Blo	1A 250V	FA-4		313001. (3AG Slo/Blo 1A)	B41001	MDL1	HKP

MISCELLANEOUS

ITEM No.	PART NAME	NEWCOMB PART No.	NOTES
M2	Pilot Light		TS47
M3	Switch	SY-89	Treble Roll-Off, (Rotary Wafer Type)
M4	Switch	SY-89	Bass Cross-Over, (Rotary Wafer Type)
M5	Switch	SY-91	Function Selector (Rotary Wafer Type)
M6	Switch		Power On-Off



RESISTANCE READINGS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	12AX7	†340K	1.8Meg	0Ω	26Ω	26Ω	†405K	1.8Meg	0Ω	26Ω
V2	6AV6	1.8Meg	0Ω	26Ω	26Ω	0Ω	0Ω	†155K		
V3	12AX7	†127K	660K	470Ω	26Ω	26Ω	†127K	650K	100K	26Ω
V4	6V6GT	TP	26Ω	†250Ω	†2000Ω	560K	TP	26Ω	300Ω	
V5	6V6GT	TP	26Ω	†270Ω	†2000Ω	560K	TP	26Ω	300Ω	
V6	5Y3GT	NC	20K (Multi)	NC	150Ω	TP	160Ω	NC	20K (Multi)	

ALL MEASUREMENTS TAKEN IN "AUX" POSITION.
† MEASURED FROM PIN 8 OF V6.
NC NO CONNECTION.
TP TEST POINT.

1. DC voltage measurements taken with vacuum tube voltmeter, AC voltages measured at 1000 ohms per volt.
2. Socket connections are shown as bottom views.
3. Measured values are from socket pin to common negative
4. Line voltage maintained at 117 volts for voltage readings
5. Nominal tolerance of component values makes possible a variation of ±15% in voltage and resistance readings
6. All controls at minimum, proper output load connected

@ SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION

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PHOTOFACT* Folder

*TRADE MARK

SENTINEL CHASSIS U72-01AA, U72-02AA, V72-01AA, V72-02AA (72 Series)

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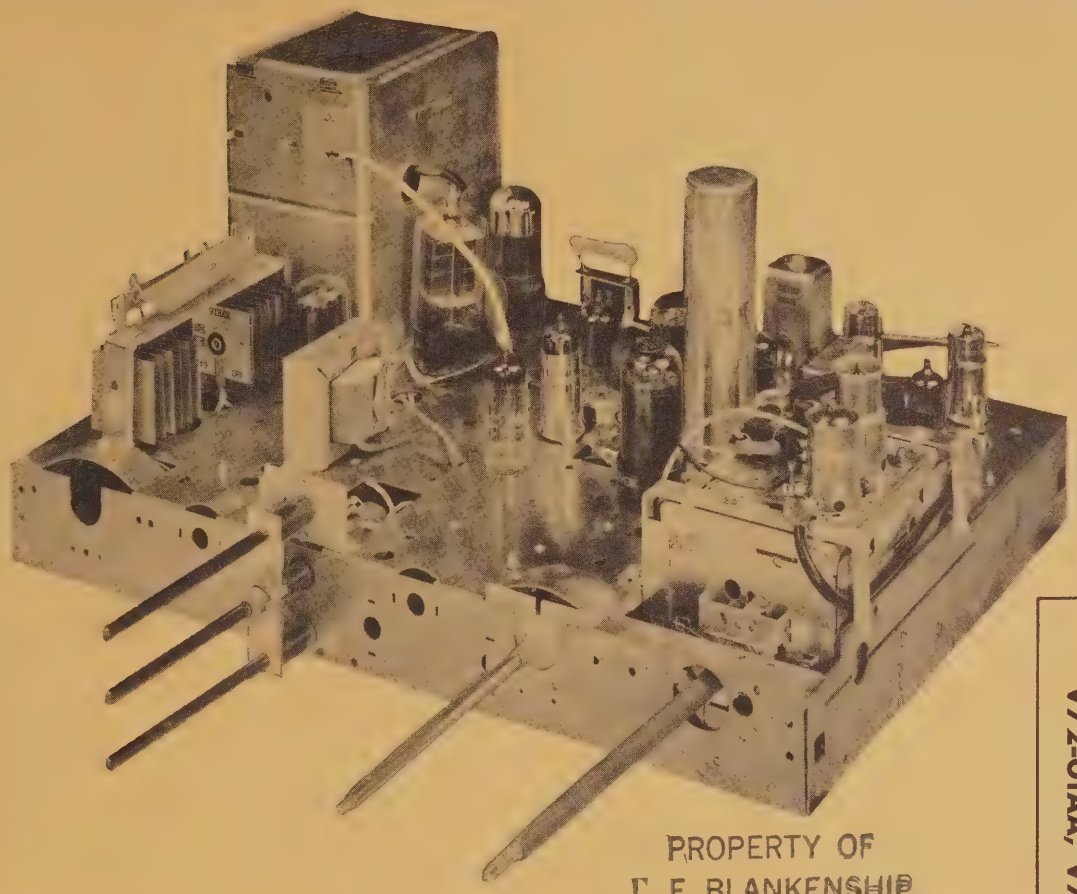

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TRADE NAME	Sentinel Chassis U72-01AA, U72-02AA, V72-01AA, V72-02AA (72 Series)
MANUFACTURER	Sentinel Radio Co., Fort Wayne 4, Indiana
TYPE SET	Television Receiver
TUBES	Seventeen
POWER SUPPLY	110-120 Volts AC, 60 Cycle RATING 150 Watts, 1.25 Amp . @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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SENTINEL CHASSIS U72-01AA, U72-02AA, V72-01AA, V72-02AA (72 Series)

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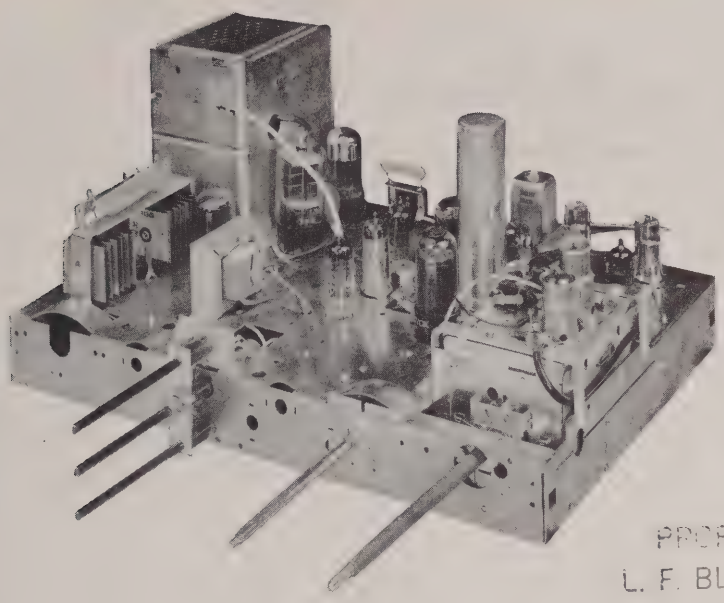

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CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. Set the fine tuning at the center of its range. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

FOCUS

The focus may be varied by the position of a strap on the base of the picture tube. The strap can be connected between 6 and 10 or 6 and 1. Readjust the ion trap for the best focus consistent with maximum brightness.
Always replace ground clip to pin 1.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSES

A 7.5Ω fusible resistor (R81) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.

2. Set the brightness and contrast controls for a normal picture.

3. Turn the horizontal hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.

4. Turn the horizontal hold slowly counter clockwise until the picture just falls into sync.

SENTINEL CHASSIS U72-01AA, U72-02AA, V72-01AA, V72-02AA (72 Series)

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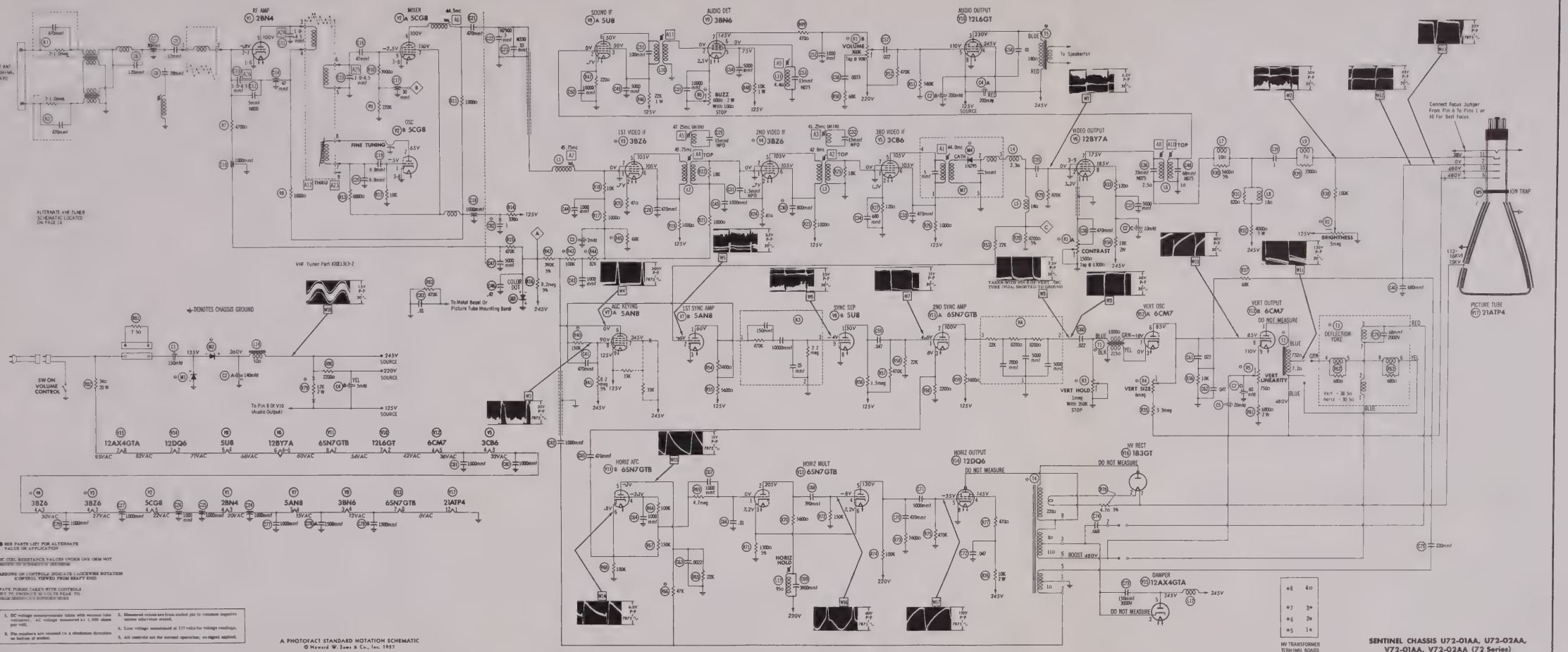
RF AMP
V1 28N4
MIXER
V2A 5CG8
OSC
V2B 5CG8
FINE TUNING
VHF ANT TERMINAL BOARD
ALTERNATE VHF TUNER SCHEMATIC LOCATED ON PAGE 14
VHF Tuner Part #20E313-2
SOUND IF
V8A 5U8
AUDIO DET
V9 3BN6
AUDIO OUTPUT
V10 12L6GT
VOLUME 300K
BUZZ 600Ω 2W With 100Ω STOP
To Speaker(s)
1ST VIDEO IF
V3 3BZ6
2ND VIDEO IF
V4 3BZ6
3RD VIDEO IF
V5 3CB6
VIDEO OUTPUT
V6 12BY7A
CONTRAST 1500Ω Tap @ 1300Ω
BRIGHTNESS 5meg
Connect Focus Jumper From Pin 6 To Pins 1 or 10 For Best Focus
ION TRAP
PICTURE TUBE
V17 21ATP4
AGC KEYING
V7A 5AN8
1ST SYNC AMP
V7B 5AN8
SYNC SEP
V8B 5U8
2ND SYNC AMP
V11A 6SN7GTB
VERT OSC
V12A 6CM7
VERT HOLD 1meg With 350K STOP
VERT SIZE 4meg
VERT OUTPUT
V12B 6CM7
DO NOT MEASURE
VERT LINEARITY 750Ω
DEFLECTION YOKE
Vert - 38.5Ω
Horiz - 30.3Ω
HORIZ AFC
V11B 6SN7GTB
HORIZ MULT
V13 6SN7GTB
HORIZ OUTPUT
V14 12DQ6
DO NOT MEASURE
HV RECT
V16 1B3GT
DO NOT MEASURE
BOOST 480V
DAMPER
V15 12AX4GTA
DO NOT MEASURE
HV TRANSFORMER TERMINAL BOARDS
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
To Pin 8 Of V10 (Audio Output)
To Metal Bezel Or Picture Tube Mounting Band
245V SOURCE
220V SOURCE
125V SOURCE
TAKEN WITH HOT LEAD OF VERT. OSC TUBE (V12A) GROUNDED TO GROUND
V15 12AX4GTA 95VAC
V14 12DQ6 71VAC
V8 5U8 66VAC
V6 12BY7A 60VAC
V11 6SN7GTB 54VAC
V10 12L6GT 42VAC
V12 6CM7 36VAC
V5 3CB6 32VAC
V4 3BZ6 30VAC
V3 3BZ6 27VAC
V2 5CG8 22VAC
V1 28N4 20VAC
V7 5AN8 15VAC
V9 3BN6 12VAC
V13 6SN7GTB 7VAC
V17 21ATP4 0VAC
● SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN TO SCHEMATIC ACCURACY
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE VOLTS PEAK TO PEAK INDICATED WITHOUT SIGNAL
1. DC voltage measurements taken with vacuum tube voltmeter. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
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TUBE PLACEMENT CHART

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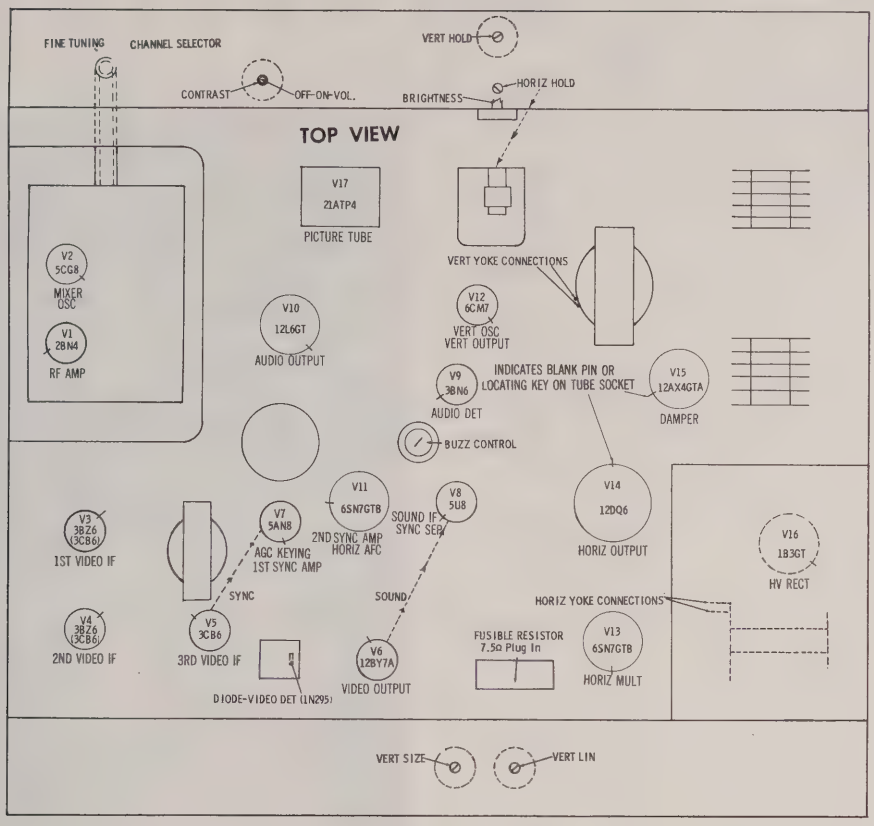


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

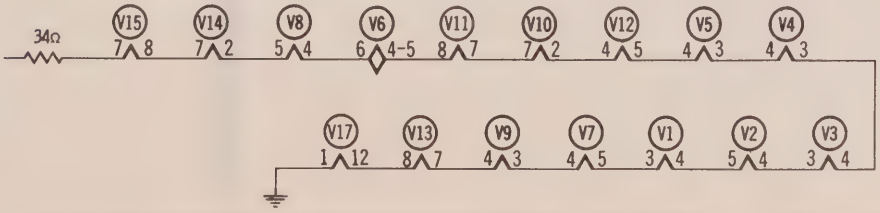
POWER SUPPLY FAILURE
No raster, no sound - Fusible Resistor (R81), Rectifiers (M1, M2)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, Diode (M4), V6, V10
No pic, no sound, has snow - V1, V2, V3, V10
No pic, has sound, has raster - V6, V17
Has pic, no sound - V8, V9, V10
Overloaded picture - V7, Diode (M3), V10

SYNC FAILURE
No vert. sync - V7, V8, V11, V10
No horiz. sync - V7, V8, V11, V10
No vert. or horiz. sync - V7, V8, V11, V10

SWEEP FAILURE
No raster, has sound - V11, V13, V14, V15, V16, V17
No vertical deflection - V12
Poor vert. linearity or foldover - V12
Poor horiz. linearity or foldover - V13, V14, V15
Narrow picture - V13, V14, V15, M1, M2
Vert. off freq. - V12
Horiz. off freq. - V13

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative (See circuit below.).



SENTINEL CHASSIS U72-01AA, U72-02AA,
V72-01AA, V72-02AA (72 Series)
CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.
Allow a 20 minute warm-up period for the receiver and test equipment.
The high voltage lead should be securely taped and kept away from the chassis.

VIDEO IF ALIGNMENT

If the chassis is equipped with a "Locality Adjuster" switch, set it to the strong signal position.
Connect the negative lead of a 3 volt bias supply to point (A). Positive to chassis.
Use only enough sweep generator output to provide a usable indication on VTVM.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to point (B). Low side to chassis.	44.0MC (Unmod)	Any non-interfering channel	DC probe thru 47K to point (C). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	42.8MC	"	"	A2	"
3.	"	"	41.25MC	"	"	A3	Adjust for MINIMUM deflection.
4.	"	"	45.75MC	"	"	A4	Adjust for maximum deflection.
5.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection.
6.	"	"	44.5MC	"	"	A6	Adjust for maximum deflection.
7.	"	"	45.75MC	"	"	A7	"

OVERALL VIDEO IF RESPONSE CHECK

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Direct	High side to point (B). Low side to chassis.	43.5MC (10MC Swp)	41.25MC 42.75MC 45.75MC 47.25MC	Any non-interfering channel	Vert. Amp. thru 47K to point (C). Low side to chassis.		Check for response curve similar to Fig.1 with markers as indicated. If necessary, retouch A1 thru A7 for desired response.

4.5MC TRAP ALIGNMENT

Adjust the fine tuning to the point that sound just appears in the picture (4.5MC Beat Pattern). Adjust A8 for MINIMUM 4.5MC beat interference in the picture.

SOUND IF ALIGNMENT

Tune in a strong TV signal and set the buzz control (R6) to the center of its range.
Adjust A9 for maximum undistorted sound.
Reduce the signal strength by disconnecting the antenna or inserting an attenuator between the antenna and antenna terminals until a hiss is heard in the sound. Turn the contrast control fully counter clockwise. Adjust A10 and A11 for maximum sound. Reconnect antenna or remove attenuator and turn contrast control fully clockwise.
Adjust the buzz control for MINIMUM buzz in the sound.

OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the center of its range.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 47K to point (C). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 2. Video marker should fall at 45%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

ALIGNMENT INSTRUCTIONS (cont)

RF AND MIXER ALIGNMENT FOR TUNER #20E1313-2

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect bias as under "Video IF Alignment".
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	195MC (10MC Swp)	193.75MC 197.75MC	10	Vert. Amp. thru 10K to point (B). Low side to chassis.	A24, A25	Adjust A24 and A25 for response similar to Fig. 3 with markers on shoulders of curve.
11.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	"	"	A26	Adjust for MINIMUM amplitude of response curve.
12.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make compromise adjustment of A24 and A25 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			207MC (10MC Swp)	205.25MC 209.75MC	12			
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 197.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

RF AND MIXER ALIGNMENT FOR TUNER #20E1271

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Connect bias as under "Video IF Alignment".
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru 10K to point (B). Low side to chassis.	A27, A28, A29	Adjust for response curve similar to Fig. 3 with markers above 90%.
11.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 3. If markers fall below 70% on any channel, make compromise adjustments of A27, A28 and A29 with channel switch set to that channel. Check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

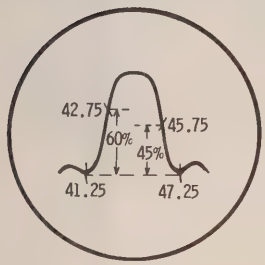


FIG. 1

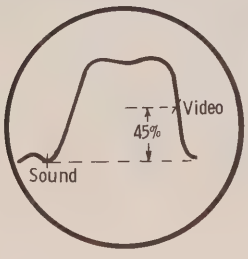


FIG. 2

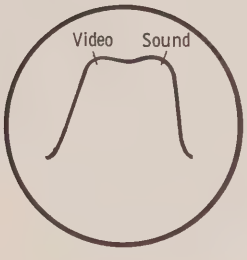


FIG. 3

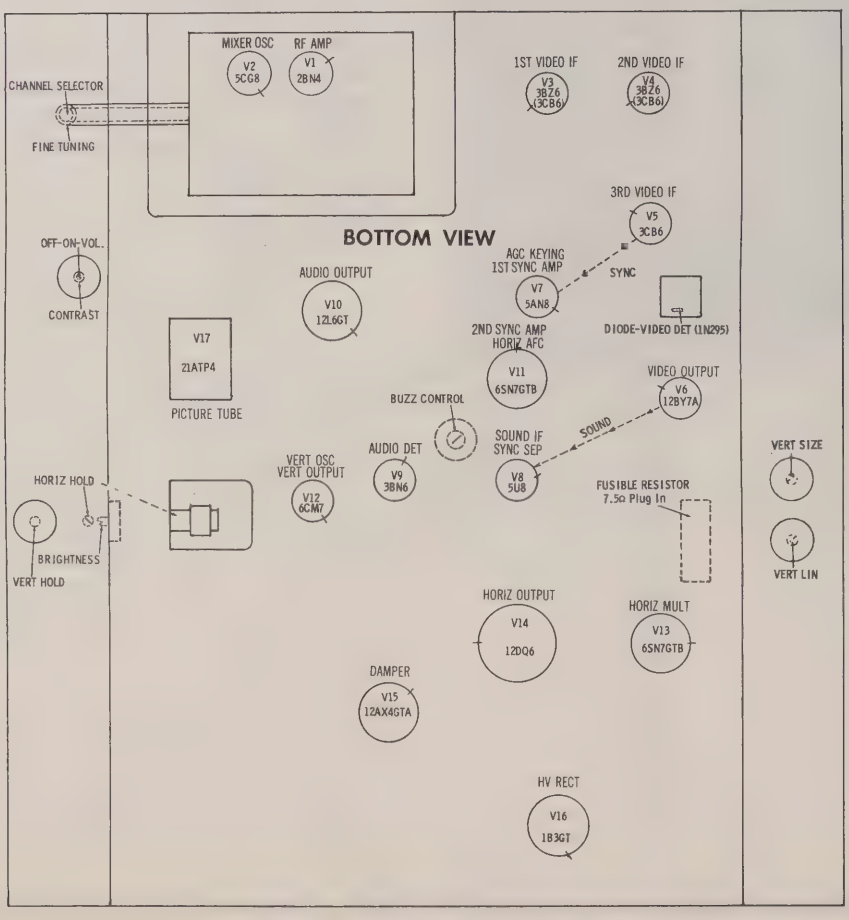
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

SENTINEL CHASSIS U72-01AA, U72-02AA,
V72-01AA, V72-02AA (72 Series)

RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	2BN4	0Ω	1Meg	5Ω	5.5Ω	▪ 1300Ω	0Ω	1Meg		
V2	5CG8	10K	▪ 7000Ω	0Ω	6.5Ω	5.5Ω	▪ 1300Ω	▪ 330Ω	0Ω	220K
V3	3BZ6	80K	47Ω	6.5Ω	7.5Ω	▪ 1000Ω	▪ 1000Ω	0Ω		
V4	3BZ6	70K	47Ω	7.5Ω	8.5Ω	▪ 1000Ω	▪ 1000Ω	0Ω		
V5	3CB6	.1Ω	120Ω	8.5Ω	9.5Ω	▪ 1000Ω	▪ 1000Ω	0Ω		
V6	12BY7A	• 140Ω	470K	0Ω	14.5Ω	14.5Ω	16Ω	† 4000Ω	† 18K	0Ω
V7	5AN8	▪ 11K	27K	0Ω	4Ω	5Ω	230K	† 52Ω	150K	▪ 0Ω
V8	5U8	▪ 1.5Meg	1Ω	▪ 22K	16Ω	17Ω	▪ 22K	220Ω	0Ω	2.2Meg
V9	3BN6	• 500Ω	.5Ω	4Ω	3Ω	▪ 10K	4.4Ω	† 300K		
V10	12L6GT	NC	10.5Ω	† 230Ω	† 52Ω	240K	TP	13.5Ω	¶	
V11	6SN7GTB	20K	▪ 5600Ω	2200Ω	350K	13K	100K	13.5Ω	14.5Ω	
V12	6CM7	‡ 750Ω	NC	215Ω	10.5Ω	9.5Ω	• ‡ 4.5Meg	• 500K	• ‡ 4.5Meg	7000Ω
V13	6SN7GTB	5Meg	† 7700Ω	1300Ω	150K	† 100K	1300Ω	3Ω	1.5Ω	
V14	12DQ6	TP	17Ω	TP	† 10K	470K	TP	19Ω	0Ω	TOP CAP ‡ 8Ω
V15	12AX4GTA	NC	NC	¶	NC	† 52Ω	TP	22Ω	19Ω	
V16	1B3GT	PINS 1 THRU 8 HAVE INFINITE RESISTANCE								TOP CAP ‡ 228Ω
V17	21ATP4	0Ω	78K	PIN 6 ‡ 11Ω	PIN 10 ‡ 11Ω	PIN 11 • 370K	PIN 12 1.5Ω			

▪ MEASURED FROM 125 VOLT SOURCE.
• THIS READING WILL VARY, CONTROL SET FOR NORMAL OPERATION.
† MEASURED FROM OUTPUT OF M2.
‡ MEASURED FROM PIN 3 OF V15.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION
TP TIE POINT



TUBE PLACEMENT CHART

CHASSIS TOP VIEW

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No.	USE	TYPE	NOTES
V1	R.F Amplifier	2BN4	
V2	Mixer-Oscillator	3CG6	
V3	1st Video IF Amp	3BZ6	Note 1
V4	2nd Video IF Amp	3BZ6	Note 1
V5	3rd Video IF Amp	3CB6	
V6	Video-Output	2BY7A	
V7	AGC Keying-1st Sync Amp	5AU8	
V8	Sound IF Amp -Sync Sep	5U8	
V9	Audio Det	3BN6	
V10	Audio Output	1EL6GT	
V11	2nd Sync Amp -Horiz. AFC	6SN7GTB	
V12	Vert Osc -Vert Output	6CM7	
V13	Horiz Mult	6BN7GTB	
V14	Horiz Output	12DQ6	
V15	Damper	12AX4GTA	
V16	HV Rectifier	1B3GT	

Note 1. A 6CB6 may be used in this application.

PICTURE TUBE

ITEM No.	REPLACEMENT DATA			NOTES
	SENTINEL PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V17	21ATP4	21ATP4A/21ATP4	21ATP4 21ATP4A ② 21ATP4A ② 21BTP4 ②	① Aluminized ② Silver screen "88"

ELECTROLYTIC CAPACITORS

ITEM No.	RATING		REPLACEMENT DATA						
	CAP	VOLT	SENTINEL PART No.	AEROVOX PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	PYRAMID PART No.	SANGAMO PART No.	SPRAGUE PART No.
C1	150	150	270551-1	AFH1-24	FP1/7	TM2-25	S-105	TY1-1429	
C1A	4140	300	270554-1	AFH24-47-60	FP330.74 TC492		Q-163	MTD-4540	R328L *
B	4300	150							
C	40	300							
D	80	50							
C3	30	50	270037-22	PR350V2	BBR2-50	TC303	TD-2-50	MT-0502	TVA-1301
C4A	200	150	270552-1	PR2-100	E310399	WD345	TDLT-16	D-088	TVA-2467
B	5	150							
C9	20	500	270553-1	PR3500V20	BR2050	TC83	TD-20-500	S-315	TVA-1905

* Non-catalog item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	SENTINEL PART No	AEROVOX PART No	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No	MALLORY PART No	SPRAGUE PART No	
C6	120			BPD-00012	DD-121	LJ0T12	ED-120	UC-5312	5GA-T12	
C7	30									
C8	28									
C9	12									
C10	1000			EF-001	MFT-1000				503C-D1	N800
C11	1.0-4.5			829-6		532-B				
C12	5									
C13	1.0-4.5			829-6		532-B				
C14	47									
C15	1.0-4.5			829-6		531-B				
C16	47									
C17	30									
C18	1000			EF-001	MFT-1000				503C-D1	
C19	6.8									
C20	8.8									
C21	470			BPD-00047	DD-471	BYAJ0T47	ED-470	UC-5347	5GA-T47	
C22	5									N7500
C23	33									N330
C24	1000			EF-001	MFT-1000				503C-D1	
C25	1000			EF-001	MFT-1000				503C-D1	
C26	1000			EF-001	MFT-1000				503C-D1	
C27	1000			EF-001	MFT-1000				503C-D1	
C28	470		250307-50	SI 470	D6-471	BYAJ0T47	GP-470	UC-5347	5GA-T47	
C29	15			NP0-SI 15	TCZ-15	CTAQ5C	TCO-15		STCC-Q5	NP0
C30	800			BPD-0008	DD-801	LJ0T8			5GA-T8	Note 1
C31	1.5		250088-145	NPO-SI 1 5	TCZ-1R5	CHV5C	TCO-1 5	Z7T-5515	STCC5-Y1S	NP0
C32	15			NP0-SI 15	TCZ-15	CTAQ5C	TCO-15		STCC Q15	NP0
C33	470		250159-1090	1468-00047	DD-471	SW5T47	ED-470	UC-5347	5FM-347	
C34	680		250307 51	SI 680	D6-681	LT6T68	GP-680	UC-5368	5GA-T68	
C35	1.1	300	250312-13	P388N-1	DF-104	CUB2P1		GEM-201	2TM-P1	
C36	33		250088-145							N075
C37	1000		250175 1	BPD-001	DD-502	BYA0D5	ED-005	DC525	5HK-D5	
C38	470		250307-50	SI 470	D6-471	BYAJ0T47	GP-470	UC-5347	5GA-T47	
C39	1.1	400	250211-13	P488N-1	DF-104	CUB4P1		GEM-401	4TM-P1	
C40	680		250.75-36	SI 680	D6-681	BYAJ0T68	ED-680	UC-5368	5GA-T68	
C41	470		250207-50	BPD-00047	DD-471	BYAJ0T47	ED-470	UC-5347	5GA-T47	
C42	1000		250207-52	SI 1000	D6-102	LT5D1	GP-1000	DC521	5HK-D1	
C43	1000		250207-52	SI 1000	D6-102	LT5D1	GP-1000	DC521	5HK-D1	
C44	1000		250175-14	BPD-001	DD-102	BYA5D1	ED-1000	DC521	5HK-D1	
C45	1000		250175-14	BPD-001	DD-102	BYA5D1	ED-1000	DC521	5HK-D1	
C46	1.47	100	250172-11	P288N-47		CUB2P47		GEM-2047	2TM-P47	
C47	1000		250175-1	BPD-005	DD-502	BYA0D5	ED-005	DC525	5HK-D5	
C48	68		250088-147							N750
C49	5000		250175-1	BPD-005	DD-502	BYA0D5	ED-005	DC525	5HK-D5	
C50	10000		250175-2	BPD-01	DD-103	BYA8D1	ED-01	DC51	5HK-S1	
C51	100		250159-1082	1468-0001	DD-101	5W5T1	ED-100	UC-531	1FM-31	
C52	1000		250207-52	SI 1000	D6-102	LT5D1	GP-1000	DC521	5HK-D1	
C53	15		250088-140							N750
C54	5000		250175-1	BPD-005	DD-502	BYA0D5	ED-005	DC525	5HK-D5	
C55	10000		250175-2	BPD-01	DD-103	BYA8S1	ED-01	DC51	5HK-S1	
EB5	.0033	400	250211-6	BPD-0033	DH-332	CUB4D33	GP-3300	GEM-4332	4TM-D33	
C57	.022	200	250212-9	BPD-02	DF-203	CUB2S22	ED-02	GEM-2222	2TM-S22	
C58	01	400	250211-7	BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C59	047	400	250211-11	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C60	022	400	250211-9	BPD-05	DF-203	CUB4S22	ED-02	GEM-4122	4TM-S22	
C61	022	400	250211-8	BPD-02	DF-203		ED-02	GEM-4122	4TM-S22	
C62	047	400	250211-11	BPD-02	DF-503	CUB4S47		GEM-4147	4TM-S47	
EB8	.0022	400	250211-3	BPD-05	DD-222	CUB4D22	GP-2200	GEM-4222	4TM-D22	
C64	100		250175-14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D1	
C65	470		250207-50	SI 470	D6-471	LT6T47	GP-470	UC-5347	5GA-T47	
C66	01	400	250211-7	BPD 01	DD-103	CUB4S1	GP-10000	GEM-411	4TM-S1	
C67	1000		250175-14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D1	
C68	1000		250159-1069	1468-00039	DD-356	5W5T39	ED-390	UC-5339	5FM-339	
C69	3900		250160-1072	1467-0039	D6-402	1W5D39	ED-004	UC-534	1FM-239	
C70	470		250159-1090	1468-00047	DD-471	5W5T47	ED-470	UC-5347	5FM-347	
C71	5000		250175-1	BPD-005	DD-502	BYA0D5	ED-005	DC525	5HK-D5	

CAPACITORS (cont)

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP	VOLT	SENTINEL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL DUBILIER PART No.	ERIE PART No	MALLORY PART No.	SPRAGUE PART No.	
C72	047	400	250211-11	BPD-05	DF-503	CUB4S47		GEM-4147	4TM-S47	
C73	150	1000	250175-35	HVD-30-150		HVB3D7I5	HD3-150		30GA-T15	
C74	068	400		PSHH-068		CUB4S68		GEM-4168	4TM-S68	
C75	220		250175-37	BPD-00822	DD-221	LJ0T22	ED-220	UC-5322	5GA-T22	
C76	68	2000	250175 22	HVD-30-68	DD30-68	HVB3D6R8	HD3-68	DC30668	30GA-Q68	
C77	1000		250175-14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D1	
C78A	1500		250210-5	BPD-2K0015	DD2 152	BYCED0D15	ED2-0015	DCD2015	5HK-D15	
D	1500									
C79	1000		250175-14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D2	
C80	1000		250175 14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D2	
C81	1000		250175-14	BPD-001	DD-102	BYA8D1	ED-1000	DC521	5HK-D2	
C82	1	200		P288N-1	DF-104	CUB2P1		GEM-201	2TM-P1	Note 2
C83	01	600	250201-7	BPD-01	DD-103	CUB4S1	GP-10000	GEM-411	6TM-S1	

Note 1. Some versions use an 820MMF (Part #250178-38) in this application.
Note 2 Not used in some versions.

CONTROLS

ITEM No	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	SENTINEL PART No.	CENTRALAB PART No.	CLAROSTAT PART No.	IRC PART No.	MALLORY PART No.	
R1A	1500Ω	½	262133				UE1502S	Contrast-Tap ① 1300Ω - Note 1
B	300K	½					Not Req	Volume -Tap ② 90K
C	Switch						Not Req	
R2A	5Meg	½	262137				TA5S8	Brightness-Note 3
B	Shaft						Not Req	
R3A	1Meg	½	262163				TA16L *	Vert. Hold with 350K strap - Note 3
B	Shaft						Not Req	
R4A	5Meg	½	262137	AB-88				Vert. Size - Note 4
B	Shaft			AK-10				
R5A	750Ω	½	262138	AB-8	A4T-750-8	Q31-105	PTA75L	Vert. Size - Note 5
B	350Ω			AK-10	RN-3	TQ	Not Req.	
R6	600Ω	2	262132		39-500-100			Buzz with 100Ω stop - wire wound - Note 5

Note 1. Alternate part #320852-1.
Note 2 Alternate part #320856-1
Note 3. Alternate part #320853-1.
Note 4. Alternate part #320854-1.
Note 5. Alternate part #320854-1.
Note 6. Alternate part #320851-1.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SENTINEL PART No.	IRC PART No.	
R7	4700Ω			BTS-4700	
R8	1000Ω		2300M4-13	BTS-1000	
R9	330K			BTS-330K	
R10	3900Ω			BTS-3900	
R11	1000Ω		2300M4-13	BTS-1000	
R12	10K		2310M4-74	BTS-10K	
R13	6800Ω			BTS-6800	
R14	330Ω		2310M4-56	BTS-330	
R15	470K		2300M4-29	BTS-470K	
R16	8.2Meg	5%	2300M4-353	BTS-8.2Meg 5%	
R17	1000Ω		2300M4-13		
R18	10K		2310M4-74		
R19	1000Ω		2300M4-13	BTS-1000	
R20	47Ω		2310M4-46	BTS-47	
R21	1000Ω		2300M4-13		
R22	18K		2310M4-77	BTS-18K	
R23	1000Ω		2300M4-13	BTS-1000	
R24	47Ω		2310M4-46	BTS-47	
R25	18K		2310M4-77	BTS-18K	
R26	1000Ω		2300M4-13	BTS-1000	
R27	120Ω		2310M4-51	BTS-120	
R28	47000 5%		2300M4-175		
R29	470K		2300M4-29	BTS-470K	
R30	56000 5%		2300M4-177	BTS-56000 5%	
R31	820Ω		2310M4-61	BTS-820	
R32	4000Ω	5	260071-18	WW7T-4000	
R33	120Ω		2310M4-51	BTS-120	
R34	18K	2	2310M6-77	BTS-18K	
R35	3.3Meg		2300M4-34	BTS-3.3Meg	
R36	10K		2310M4-74	BTS-10K	
R37	68K		2310M4-84	BTS-68K	
R38	100K		2300M4-35	BTS-100K	
R39	33000		2310M4-68	BTS-3300	
R40	560K			BTS-560K	Note 1
R41	8.2Meg	5%	2300M4-353	BTS-8.2Meg 5%	
R42	390K 5%		2300M4-321		
R43	100K		2300M4-207	BTS-100K 5%	Note 2

ITEM No	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	SENTINEL PART No.	IRC PART No.	
R44	82K		2300M4-205	BTS-82K 5%	Note 2
R45	68K		2300M4-203	BTS-68K 5%	Note 2
R46	22K	1	2310M5-78	BTA-22K	
R47	330Ω		2310M4-54	BTS-330	
R48	10K	1	2310M5-74	BTA-10K	
R49	470Ω		2310M4-58	BTS-470	
R50	68K		2310M4-84	BTS-68K	
R51	560K		2310M4-96	BTS-560K	
R52	470K		2310M4-94	BTS-470K	
R53	22K		2310M4-78	BTS-22K	
R54	5600Ω		2310M4-71	BTS-5600	
R55	5600Ω		2310M4-71	BTS-5600	
R56	1.5Meg		2300M4-32	BTS-1.5Meg	
R57	470K		2310M4-94	BTS-470K	
R58	22K		2310M4-78	BTS-22K	
R59	5600Ω		2310M4-71	BTS-5600	
R60	2200Ω		2310M4-66	BTS-2200	
R61	6800Ω	2	2310M4-69	BTS-6800	
R62	6800Ω		2310M4-60		
R63	6800Ω		2310M4-69		
R64	100K		2300M4-35	BTS-100K	
R65	22K		2310M4-78		
R66	47K				Note 3
R67	180K		2310M4-88		
R68	100K		2310M4-86	BTS-100K	
R69	4.7Meg		2300M4-35		
R70	5600Ω		2310M4-71		
R71	15000 5%		2300M4-182		
R72	180K		2310M4-88	BTS-180K	
R73	5600Ω		2310M4-71		
R74	100K		2310M4-98		
R75	470K		2310M4-94	BTS-470K	
R76	10K	2	2310M5-74	BTB-10K	
R77	470Ω		2310M4-58	BTS-470	
R78	4.7Ω 5%		2310M3-3	BW1-4.7 5%	
R79	12K	2	2310M5-75	BTB-12K	Note 4
R80	2200Ω		2310M4-66	BTS-2200	
R81	7.5Ω		240602	FR7.5	
R82	34Ω	30	240071-20		
R83	470K		2310M4-94	BTS-470K	

Note 1. Some versions may use a 330K in this application.
Note 2. Manufacturer recommends 5% replacements.
Note 3. Some versions may use a 68K in this application
Note 4. Not used in some versions

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA							NOTES
		SENTINEL PART No	Holladerson PART No	Merit PART No	ECA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	Vert Osc	22E98-2	B6704	A-3006	209T1 ①	V406	A-8125	25A05	A-122③
	Alt Vert Osc.	320801-2							
T2	Vert Output	22E116-9	Z1804	A-3037	222T1	V315	A-8123	26S52	A-103X
	Alt Vert Output	320804-1							
T3A	Yoke-Boris. (SHAM)	20E1351-3	DF607①	MDF-91②	235DI ③	Y90T19/43 ②	DY-16A ②	Y-16 ②	Y-41 & NW9
B	(90°) Vert. (41. SMH)								
	Alternate Type	261212-2							
M7	Yoke Rear Cover & Centering Device	361233-1							YC1
T4	Boris. (Sharp)	20E1258C		HVO-137					
	Alt. Boris. Output	320805-2							

① Drill new mounting hole(s).
② Use original rear cover and centering device & original yoke damping network, if necessary

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	IMPEDANCE		REPLACEMENT DATA						NOTES
	PRI.	SEC.	SENTINEL PART No.	Holladerson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.	
T5	2500Ω	3-4Ω	22E119-A ①	21111	A-2948	A 3676	22345	S-1X	① Alternate part #320802-1

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA				NOTES
		SENTINEL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ist. Video IF	361301-1		TV-121		
L2	2nd. Video IF	361302-1				Includes 47.25MC Trap
L3	3rd. Video IF	361303-1				Includes 41.25MC Trap
L4	Resonant Choke	361310-1				11 Microhenries
L5	Shunt Peaking Coil	361308-1	19-6400		6136	440 Microhenries
L6A	4.5MC Trap	361305-1				
B	Ist. Sound IF					
L7	Series Peaking Coil	361306-2	19-3380	TV-186	6161	345 Microhenries
L8	Shunt Peaking Coil	361308-3	19-3660		6146	653 Microhenries
L9	Series Peaking Coil	361308-4	19-3135		6158	117 Microhenries
L10	2nd. Sound IF	361306-1				
L11	Quadrature Coil	361307-1		TV-121		
L12	R.F Choke	361311-1	19-1004		6410	6.4 Microhenries

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES		REPLACEMENT DATA								NOTES
	PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	ECA TYPE No.	Ram PART No.	Thordarson PART No.		
L13	95Ω		361302-1	19-1876	TV-163	6310			HH-5	19-47 Millihenries	

FILTER CHOKE

ITEM No.	RATINGS		REPLACEMENT DATA						
	TOTAL DIRECT CURRENT	D C RESISTANCE	INDUCTANCE (0 CURRENT 1000 ⁄ul	SENTINEL PART No.	Holladerson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L14	250A	52Ω	1 Hy	22E100-B ①	C5037 ②	C-2996 ③	C-3227	26C44 ③	C-34X

① Alternate part #320803-1.
② Drill one new mounting hole.

COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	SENTINEL PART No	REPLACEMENT DATA	
K1	Ant Isolation	470MMF, 2-1.0Meg	250751-1	Centralab	RC-471
K2	Ant Isolation	470MMF, 2-1 0Meg	250751-1	Centralab	RC-471
K3	Sync Coupler	10000MMF, 25MMF, 150MMF, 470K, 2.2Meg	250186-3		
K4	Vert. Integrator	20000MMF, 5000MMF, 6000MMF, 23K, 8200Ω, 8200Ω	250186-1	Aerovox Centralab Erie Sprague	PA-501 PC-104 1405-01 103C12

RECTIFIERS

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CURRENT (Measured)		SENTINEL PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	SARKES TARZIAN PART No.	INTERNATIONAL PART No.	MALLORY PART No.	
M1	250A		57E16 ①②		1090A ①	1N1007 ①	R3200B1 ①	85300 ①	300 ①
M2	250A		57E18 ①②		1090A ③	1N1007 ③	R3200B1 ③	68300 ③	300 ③
M3			530554-1 ①		1215 ①		1Y1 ②		

① Selenium type.
② Alternate part #520551-1
③ Germanium type

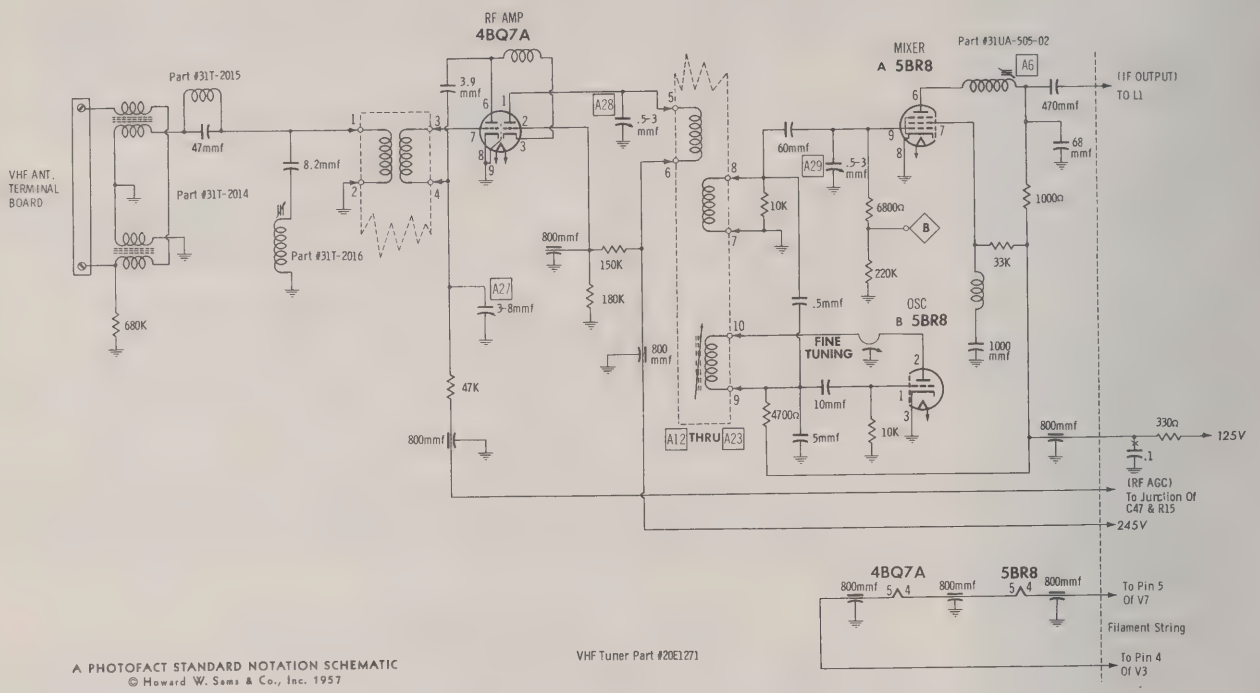
CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		SENTINEL PART No.	GE PART No.	SYLVANIA PART No.	
M4	1N295 *	530030-0	1N80	1N60	Video Det. (Pigtail)

* A 1N54 may be used in some versions

MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
M5	Tuner	20E1313-2	VHF
M6	Tuner	20E1271	VHF
M7	Crystal Det. Assy.	251204-1	Includes 4th. Video IF, peaking coil, capa., M3
M8	Centering Device	361233-1	Includes rear yoke cover
M9	Ion Trap	250492-5	



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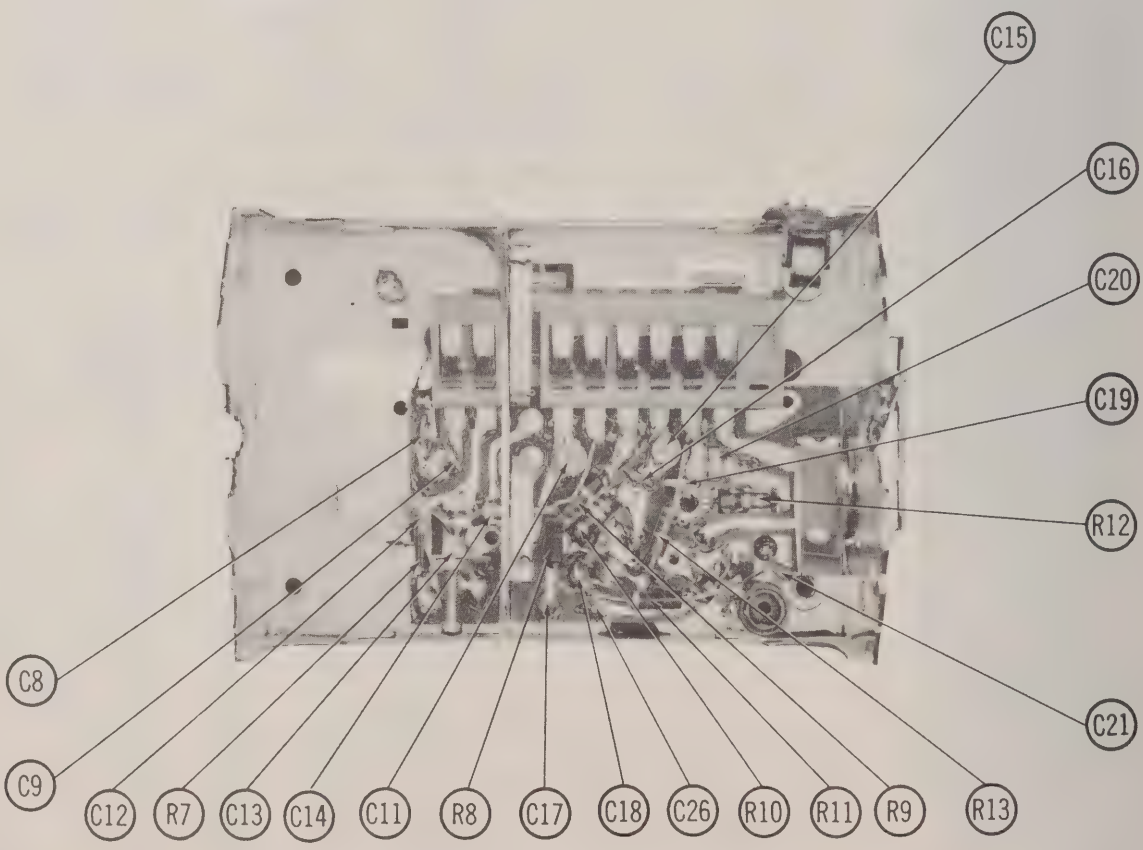
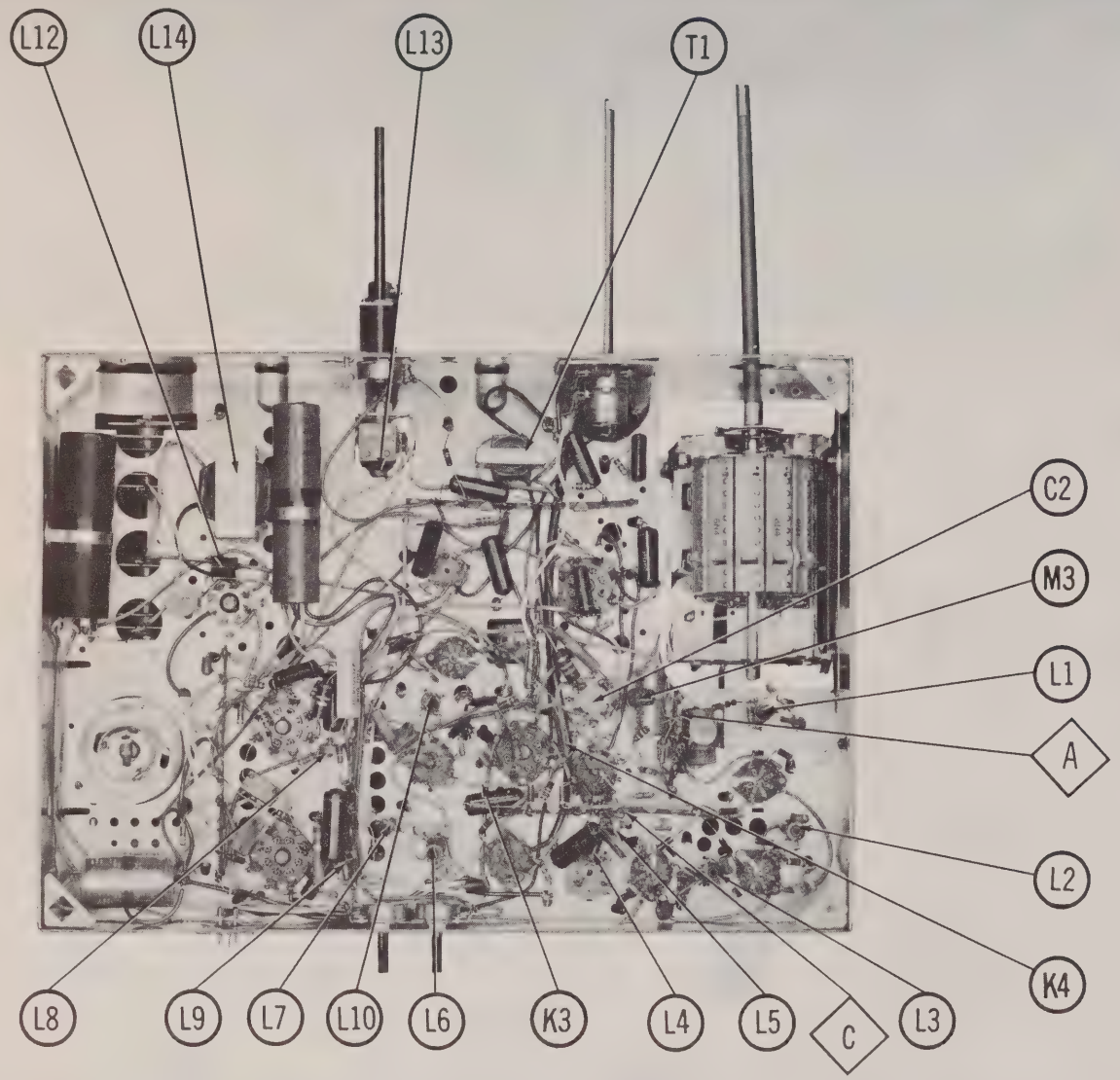
VHF Tuner Part #20E1271

ALTERNATE TUNER SCHEMATIC



RF TUNER-BOTTOM VIEW



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PHOTOFACT* Folder

*TRADE MARK

ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16Z25, U)

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MODEL Z1512J (Ch. 16Z25)

TRADE NAME	Zenith	MODELS	CHASSIS
		Z1510L, Z1511B, Z1512J	16Z25
		Z1510LU, Z1511BU, Z1512JU	16Z25U
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago 39, Ill.		
TYPE SET	Television Receiver		
TUBES	Sixteen		
POWER SUPPLY	110-120 Volts AC, 60 Cycle		RATING 135 Watts, 1.2 Amp. @ 117 Volts AC
TUNING RANGE	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC, Sound IF 41.25MC(Intercarrier)		

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ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16Z25, U)

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MODEL Z1512J (Ch. 16Z25)

DISASSEMBLY INSTRUCTIONS

CHASSIS REMOVAL

1. Remove 4 push-on type control knobs from the top.
2. Remove 11 metal screws and the rear cover.
3. Remove 4 metal screws holding the 2 chassis braces to the rear of the cabinet.
4. Remove the chassis from the front of the cabinet.

CAUTION NOTE

ONE SIDE OF AC LINE CONNECTED TO CHASSIS
Care should be exercised when connecting test equipment or physically contacting the chassis.

MODELS	CHASSIS
Z1510L, Z1511B, Z1512J	16Z25
Z1510LU, Z1511BU, Z1512JU	16Z25U

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustment of the VHF oscillator is possible by removing the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, as the channel selector is rotated. Adjust for best picture and sound.

PICTURE TUBE SAFETY GLASS CLEANING

Remove 2 push-on type control knobs from the front.
Remove 6 metal screws holding the 2 metal trims under the knobs.
Remove the safety glass.

FOCUS

Adjust the ion trap for the best focus consistent with maximum brightness.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

The horizontal frequency coil is used as the horizontal hold control. Adjust the horizontal hold until the picture synchronizes horizontally. (For location, see tube placement chart).

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate audio detector buzz, adjust the buzz control for MINIMUM buzz and maximum sound. (For location, see tube placement chart).

FUSES

A 6Ω fusible resistor (R96) is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube. Rotate the two rings around the neck of the tube until the picture is properly centered.

ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16Z25, U)

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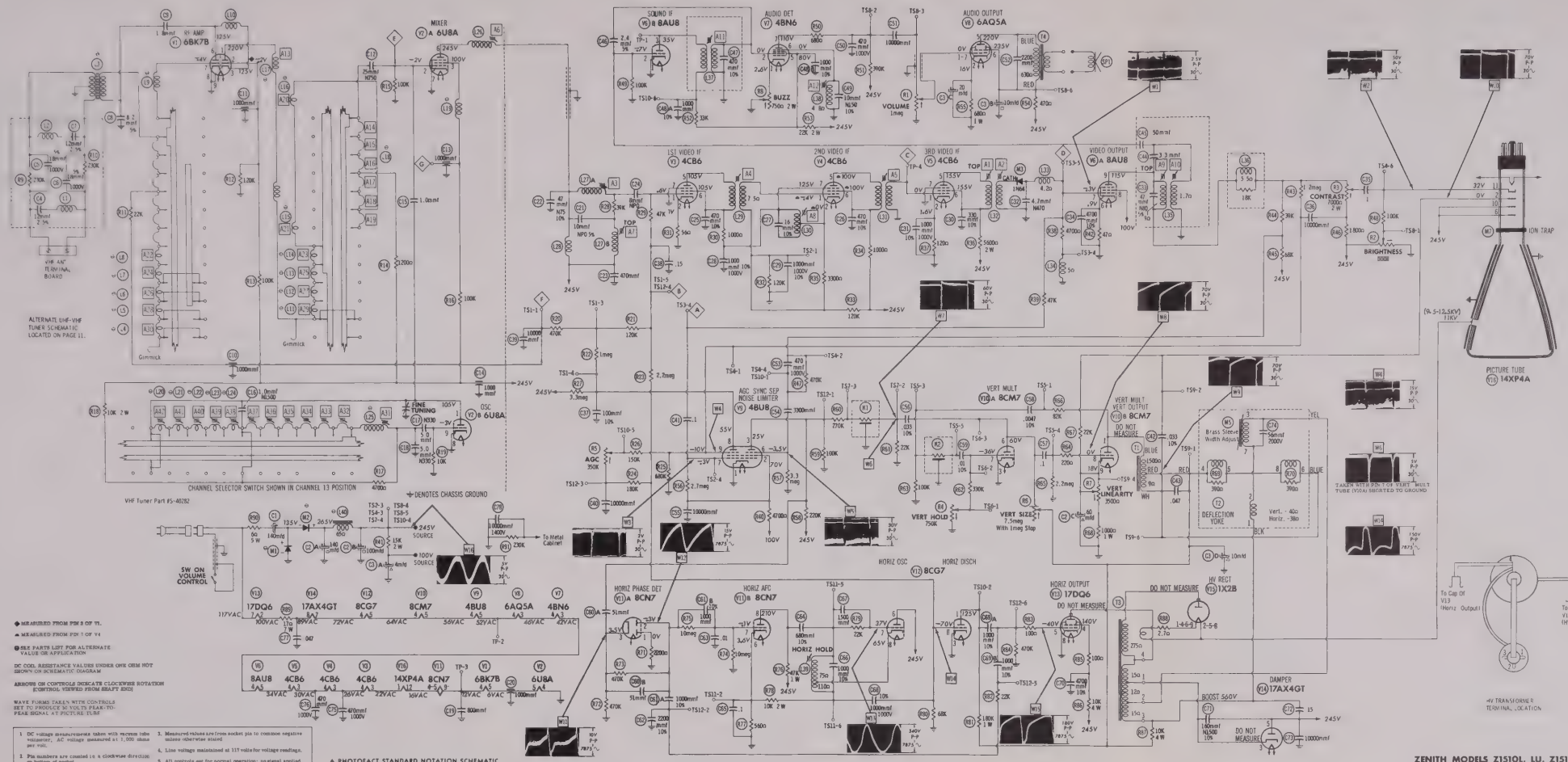
MIXER V2 A 6U8A
RF AMP V1 6BK7B
SOUND IF V5 B 8AU8
AUDIO DET V7 4BN6
AUDIO OUTPUT V8 6AQ5A
1ST VIDEO IF V3 4CB6
2ND VIDEO IF V4 4CB6
3RD VIDEO IF V5 4CB6
VIDEO OUTPUT V6 A 8AU8
OSC V2 B 6U8A
AGC SYNC SEP NOISE LIMITER V9 4BU8
VERT MULT V10 A 8CM7
VERT MULT VERT OUTPUT V10 B 8CM7
HORIZ PHASE DET V11 A 8CN7
HORIZ AFC V11 B 8CN7
HORIZ OSC V12 8CG7
HORIZ DISCH V13 8CG7
HORIZ OUTPUT V13 17DQ6
DAMPER V14 A 17AX4GT
HV RECT V15 1X2B
PICTURE TUBE V16 14XP4A
ION TRAP
CONTRAST
BRIGHTNESS
VERT LINEARITY
VERT SIZE
VERT HOLD
HORIZ HOLD
FINE TUNING
VOLUME
AGC
BUZZ
DEFLECTION YOKE
BOOST 560V
DO NOT MEASURE
DO NOT MEASURE
DO NOT MEASURE
VHF ANT. TERMINAL BOARD
ALTERNATE UHF-VHF TUNER SCHEMATIC LOCATED ON PAGE 11.
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
VHF Tuner Part #S-40282
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
To Metal Cabinet
SOURCE
SOURCE
TAKEN WITH PIN 7 OF VERT. MULT TUBE (V10A) SHORTED TO GROUND
To Cap Of V13 (Horiz. Output)
To Cap Of V15 (HV Rect.)
HV TRANSFORMER TERMINAL LOCATION
◆ MEASURED FROM PIN 8 OF V1.
▲ MEASURED FROM PIN 1 OF V4
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM
ARROWS ON CONTROLS INDICATE CLOCKWISE ROTATION (CONTROL VIEWED FROM SHAFT END)
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK-TO-PEAK SIGNAL AT PICTURE TUBE
1 DC voltage measurements taken with vacuum tube voltmeter, AC voltage measured at 1,000 ohms per volt.
2 Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation; no signal applied.
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TUBE PLACEMENT CHART

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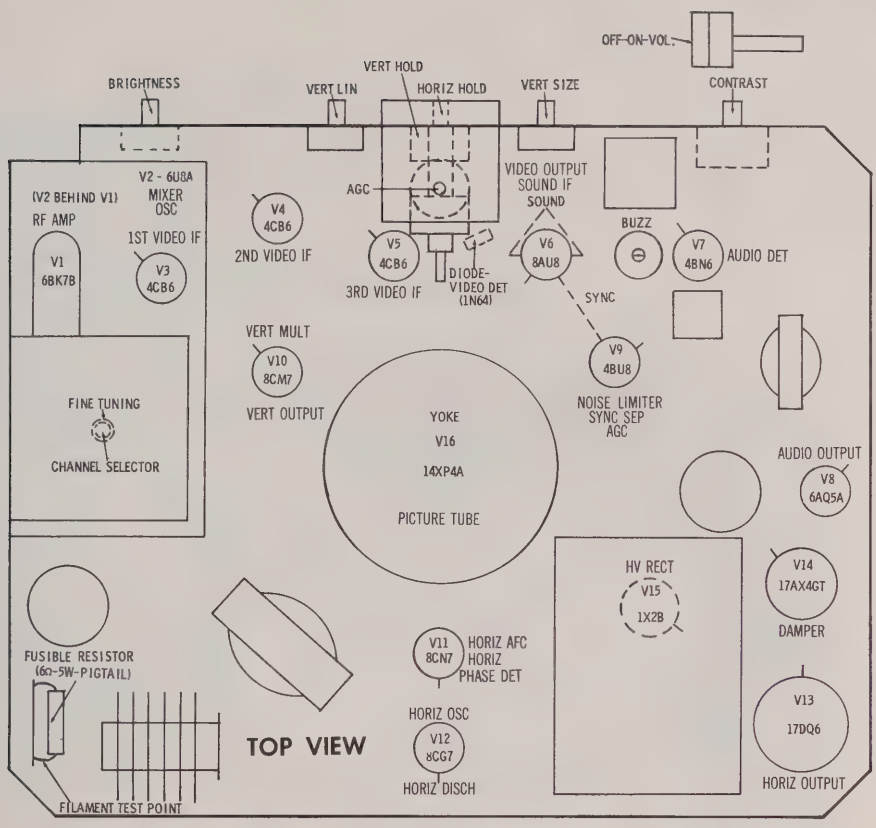


TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

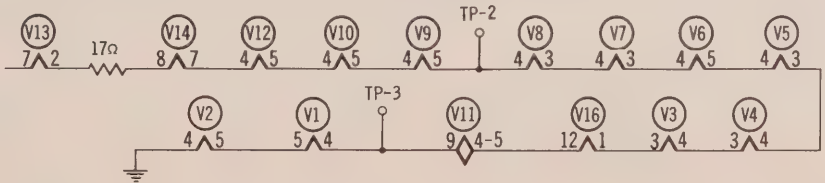
POWER SUPPLY FAILURE
No raster, no sound - Fusible Resistor (R90), Rectifier (M1, M2)

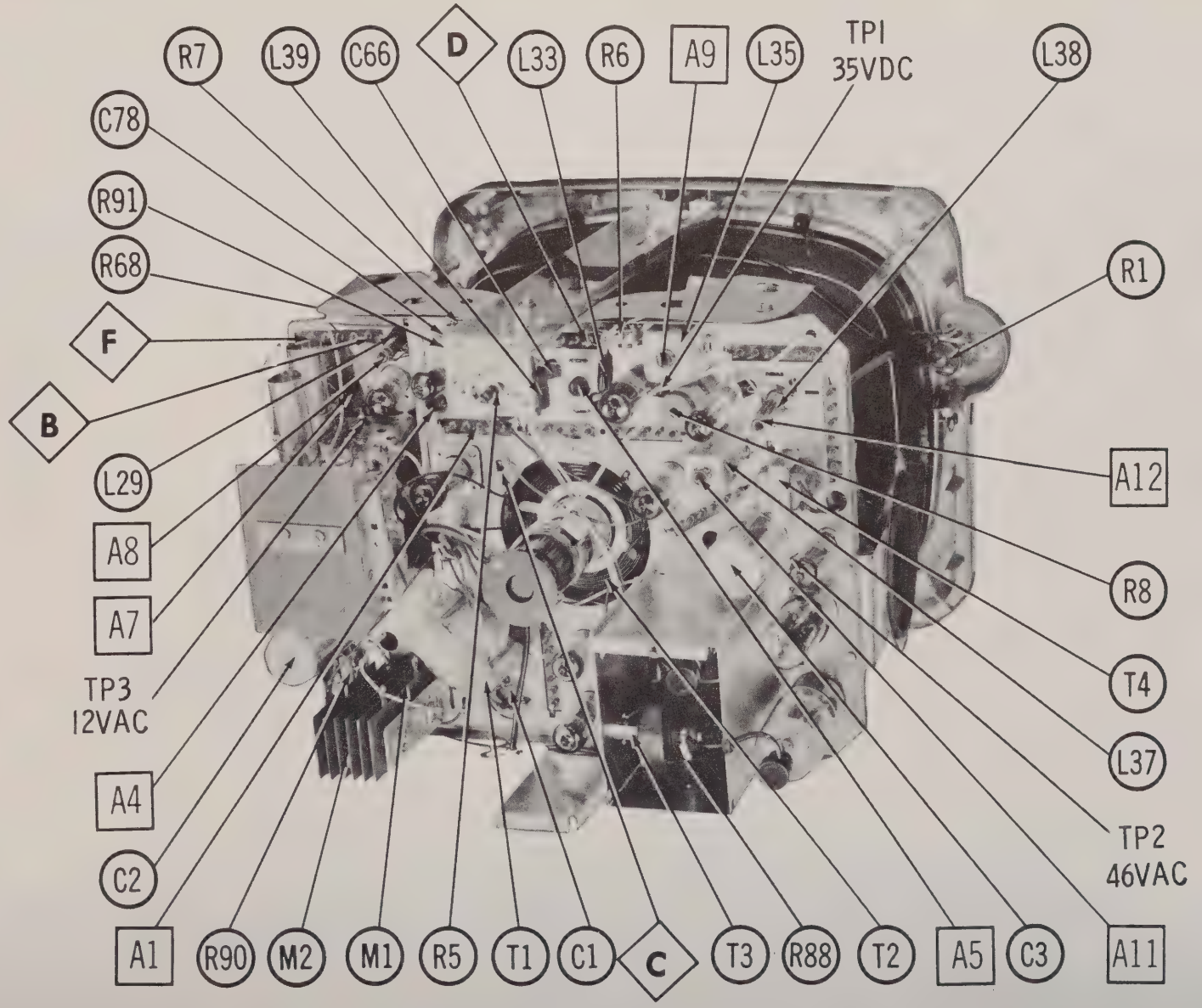
LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, Diode (M3), V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V6, V16
Has pic, no sound - V6, V7, V8
Overloaded picture - V9

SYNC FAILURE
No vert. sync - V9
No horiz. sync - V9, V11
No vert. or horiz. sync - V9

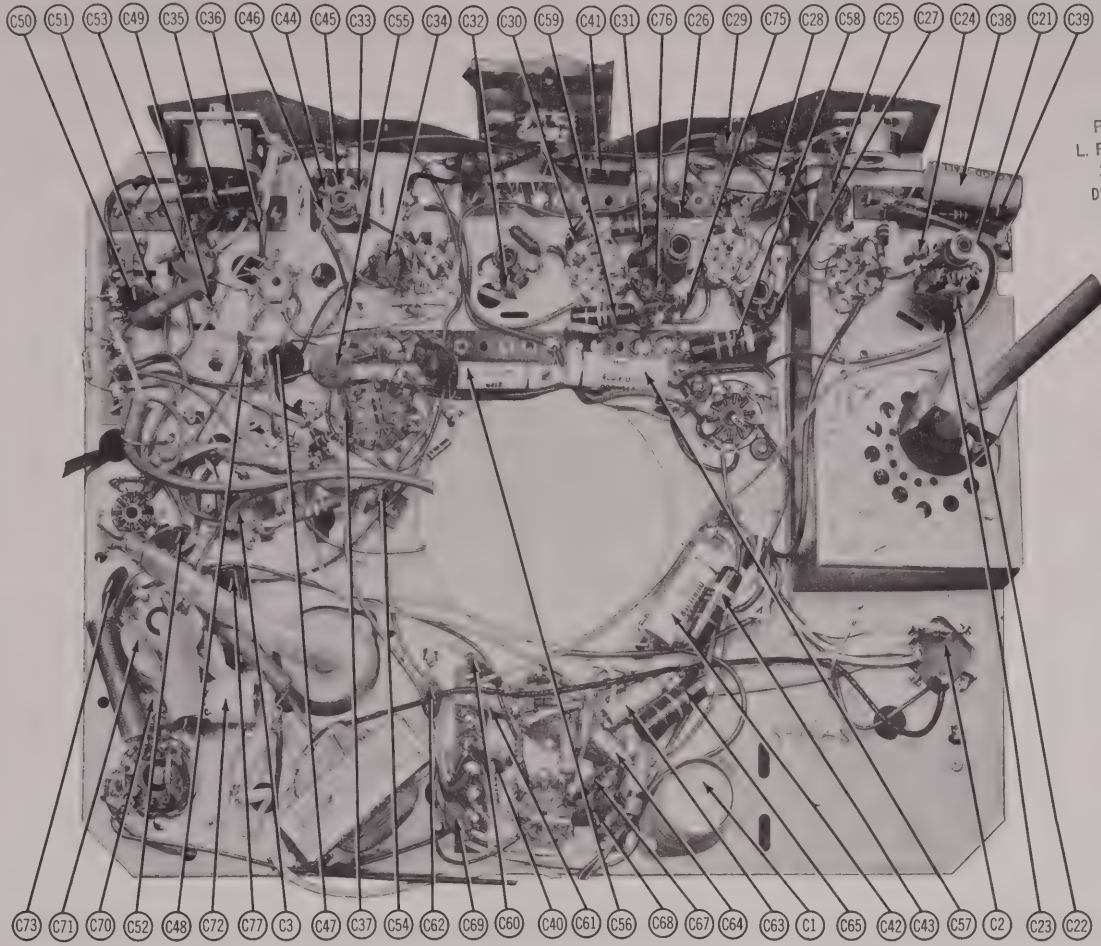
SWEEP FAILURE
No raster, has sound - V11, V12, V13, V14, V15, V16
No vertical deflection - V10
Poor vert. linearity or foldover - V10
Poor horiz. linearity or foldover - V12, V13, V14
Narrow picture - V12, V13, V14, M1, M2
Vert. off freq. - V10
Horiz. off freq. - V11, V12

This receiver employs tubes used in a series filament network, an open filament in any tube in the series will cause the set to be inoperative (See circuit below).





CHASSIS TOP VIEW



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CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

USE AN ISOLATION TRANSFORMER TO PROTECT THE TEST EQUIPMENT.

VIDEO IF ALIGNMENT

Connect a short jumper from point Ⓐ to chassis.
Connect the negative lead of a 6 volt bias supply to point Ⓑ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
1.	470MMF	High side to point Ⓒ. Low side to chassis.	43MC (10MC Swp)	41.25MC 45.75MC	Any non-interfering channel	Vert. Amp. thru 10K to point Ⓓ. Low side to chassis.	A1, A2	Adjust generator output to maintain 3 volts peak to peak on the scope. Adjust A1 and A2 for a response curve similar to Fig. 1. If proper response cannot be obtained, check to see that the coil slugs are entering their respective windings from the outer end.
2.	"	High side to point Ⓔ. Low side to chassis.	"	41.25MC 42.75MC 45.0MC 45.75MC 47.25MC	"	"	A3, A4, A5, A6	Adjust generator output to maintain 3 volts peak to peak on the scope. Adjust for response curve similar to Fig. 2. A3 & A6 affect the peak of the curve. A4, the low side and A5, the high side.
3.	"	"	"	41.25MC 47.25MC	"	"	A7	Increase scope gain 10 times. Adjust A7 for MINIMUM with 41.25MC marker at 50% as in Fig. 3.
4.	"	"	"	40.5MC 41.25MC 42.75MC 45.0MC 45.75MC	"	"	A8	Reduce scope gain to that used in steps 1 and 2. Remove bias from point Ⓑ and connect a jumper to ground. Adjust generator output for a 3 volt peak to peak indication. Adjust A8 for maximum amplitude of 40.5MC marker, but not to exceed 41.25MC marker, similar to Fig. 4. Restore set to normal.

SOUND IF ALIGNMENT

Connect an attenuator (Zenith part #S-17203 or equivalent) in series with the receiver antenna. Tune in a station below the limiting action of the 4BN6 as evidenced by a hiss similar to super-regeneration. Adjust A9, A10, A11 and A12 for maximum sound and best quality. Adjust the buzz control (R8) for MINIMUM buzz. If the hiss disappears during the alignment, increase the attenuator until it reappears.

VHF RF AND MIXER ALIGNMENT

Connect the negative lead of a 2 volt bias supply to point Ⓕ. Positive to chassis.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
5.	Fig. 5	Across antenna terminals thru matching network (Fig. 5).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point Ⓖ. Low side to chassis.	A13	Adjust by expanding or compressing coil turns for maximum amplitude and symmetry as in Fig. 6.
6.	"	"	207MC (10MC Swp)	205.25MC 209.75MC	12	"	A14	"
7.	"	"	201MC (10MC Swp)	199.25MC 203.75MC	11	"	A15	"
8.	"	"	195MC (10MC Swp)	193.25MC 197.75MC	10	"	A16	"
9.	"	"	189MC (10MC Swp)	187.25MC 191.75MC	9	"	A17	"
10.	"	"	183MC (10MC Swp)	181.25MC 185.75MC	8	"	A18	"
11.	"	"	177MC (10MC Swp)	175.25MC 179.75MC	7	"	A19	"
12.	"	"	85MC (10MC Swp)	83.25MC 87.75MC	6	"	A20, A21, A22	"
13.	"	"	79MC (10MC Swp)	77.25MC 81.75MC	5	"	A23, A24	"
14.	"	"	69MC (10MC Swp)	67.25MC 71.75MC	4	"	A25, A26	"
15.	"	"	63MC (10MC Swp)	61.25MC 65.75MC	3	"	A27, A28	"
16.	"	"	57MC (10MC Swp)	55.25MC 59.75MC	2	"	A29, A30	"

ALIGNMENT INSTRUCTIONS (cont)

VHF OSCILLATOR ALIGNMENT

Connect bias as under "Video IF Alignment".
Adjust the fine tuning so that the index hole in the fine tuning cam is centered directly below the channel 13 oscillator adjustment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Use only enough sweep generator output to provide a usable pattern on scope.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
17.	Fig. 5	Across antenna terminals thru matching network (Fig. 5).	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru 10K to point ⓓ. Low side to chassis.	A31	Adjust to place sound marker in trap notch as in Fig. 7. Video marker should fall at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A32	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A33	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A34	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A35	
			183MC (10MC Swp)	181.25MC 185:75MC	8		A36	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A37	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A38	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A39	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A40	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A41	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A42	

UHF IF ALIGNMENT

Tune in a UHF channel and adjust A43 for the best picture and least noise. .

UHF TUNER ALIGNMENT

This portion of the receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

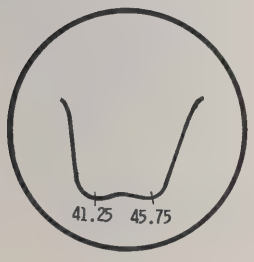


FIG. 1

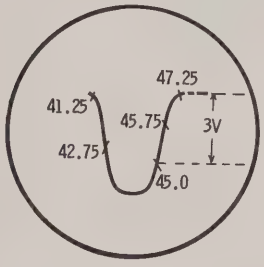


FIG. 2

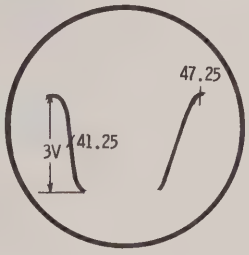


FIG. 3

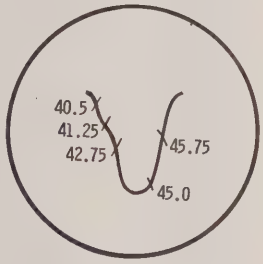
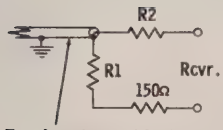


FIG. 4



Zo	R1	R2
50Ω	56Ω	120Ω
75Ω	82Ω	110Ω

FIG. 5

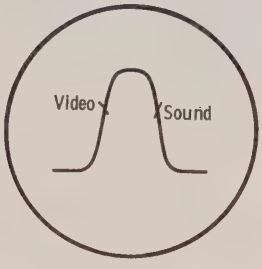


FIG. 6

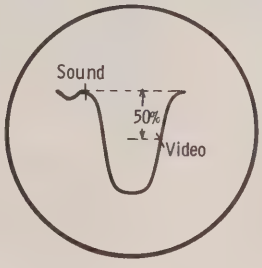


FIG. 7

ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16Z25, U)

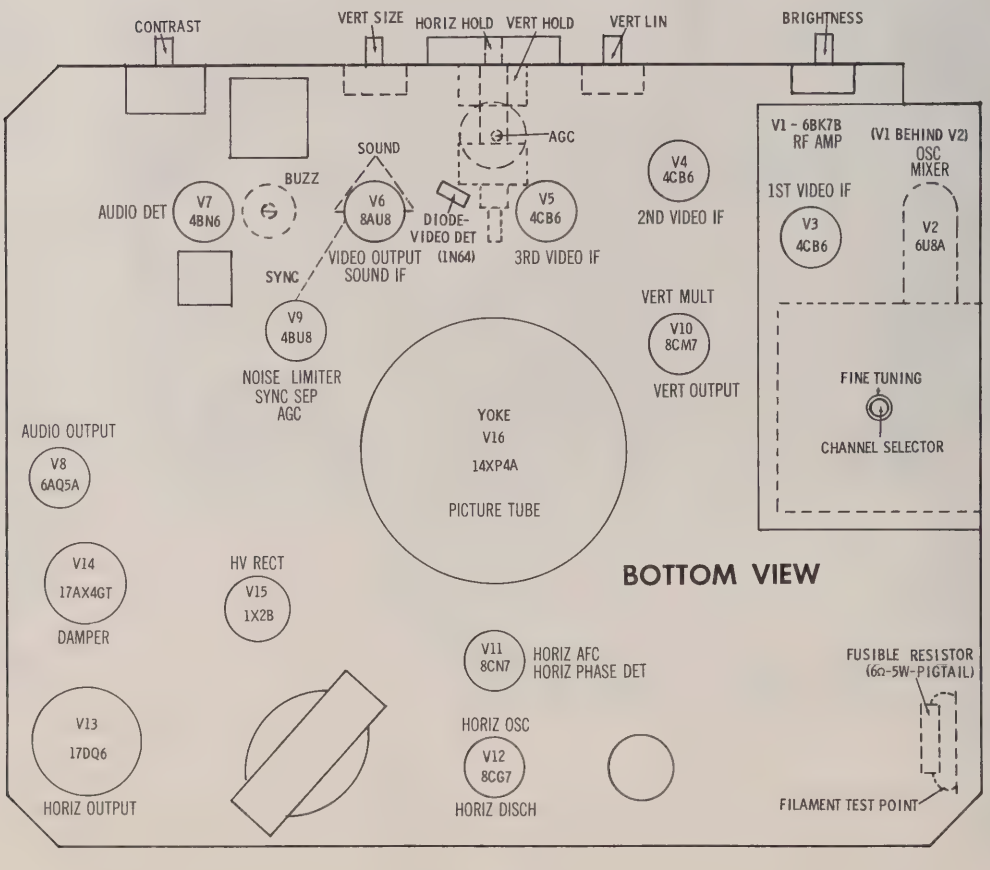
CHASSIS BOTTOM VIEW- INDUCTOR AND ALIGNMENT IDENTIFICATION

ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16225, U)

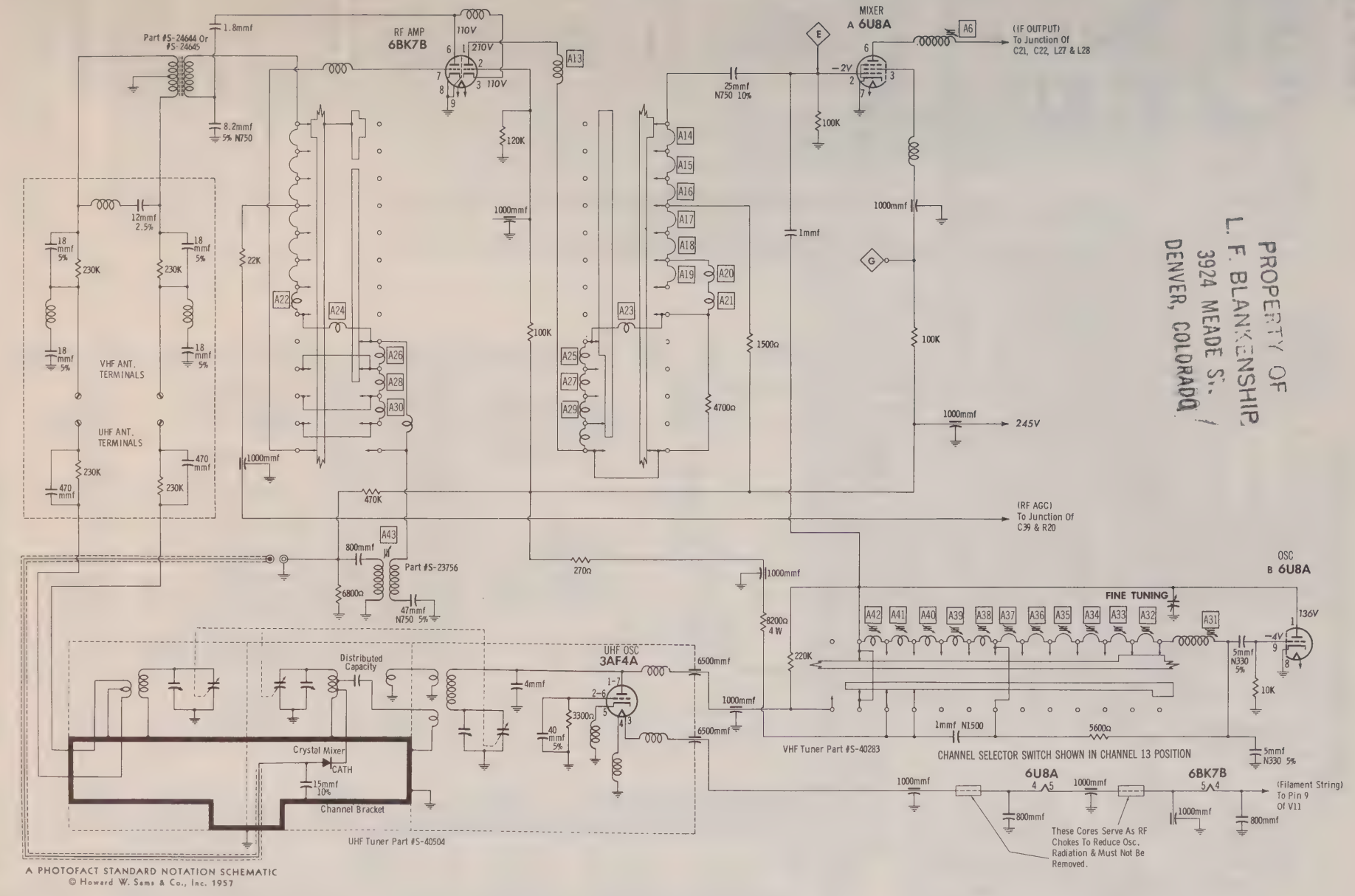
RESISTANCE MEASUREMENTS

ITEM	TUBE	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V1	6BK7B	†1200Ω	60K	INF	4Ω	2Ω	INF	1.8Meg	0Ω	0Ω
V2	6U8A	†10K	100K	†100K	0Ω	2Ω	†65Ω	0Ω	0Ω	10K
V3	4CB6	1.5Meg	56Ω	7.5Ω	8.5Ω	▬1000Ω	▬1000Ω	0Ω		
V4	4CB6	60K	▬.5Ω	8.5Ω	9.5Ω	†1000Ω	†1000Ω	60K		
V5	4CB6	.1Ω	120Ω	9.5Ω	10.5Ω	†5600Ω	†5600Ω	0Ω		
V6	8AU8	0Ω	100K	†55K	13.5Ω	10.5Ω	47Ω	4700Ω	†15K	†7000Ω
V7	4BN6	•400Ω	.5Ω	13.5Ω	14.5Ω	†22K	4.8Ω	†390K		
V8	6AQ5A	0Ω	680Ω	14.5Ω	16.5Ω	†1200Ω	†530Ω	0Ω		
V9	4BU8	0Ω	†20K	†60K	17.5Ω	16.5Ω	3.3Meg	†2.7Meg	†1.6Meg	220K
V10	8CM7	‡10K	NC	0Ω	20Ω	17.5Ω	‡• 4.5Meg	• 700K	2.2Meg	•1000Ω
V11	8CN7	2200Ω	850K	420K	6Ω	6Ω	560Ω	5Meg	†47K	4Ω
V12	8CG7	‡190K	60K	0Ω	23Ω	20Ω	†65Ω	32K	10K	NC
V13	17DQ6	TP	40Ω	NC	†10K	470K	TP	45Ω	0Ω	TOP CAP ‡15Ω
V14	17AX4GT	TP	NC	¶	NC	†65Ω	NC	23Ω	45Ω	
V15	1X2B		PINS	1 THRU 9	HAVE	INFINITE	RESISTANCE			TOP CAP ‡290Ω
V16	14XP4A	7.5Ω	•23K	PIN 6 †65Ω	PIN 10 †65Ω	PIN 11 •120K	PIN 12 6Ω			

▬ MEASURED FROM PIN 7 OF V4.
† MEASURED FROM OUTPUT OF M2.
‡ MEASURED FROM PIN 3 OF V14.
• THIS READING WILL VARY, CONTROL SET FOR NORMAL OPERATION.
¶ THIS READING CAN VARY GREATLY, (10K MINIMUM), DUE TO THE CONDITION OF THE ELECTROLYTIC CAPACITOR CONNECTED IN THE ASSOCIATED CIRCUIT.
NC NO CONNECTION .
TP TIE POINT.



TUBE PLACEMENT CHART



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DENVER, COLORADO

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ALTERNATE TUNER SCHEMATIC

ZENITH MODELS Z1510L, LU, Z1511B, BU, Z1512J, JU (Ch. 16225, U)

PARTS LIST AND DESCRIPTIONS

TUBES (GENERAL ELECTRIC, SYLVANIA)

ITEM No	USE	TYPE	NOTES
V1	RF Amplifier	6BK7B	
V2	Mixer-Oscillator	6L6A	
V3	1st Video-IF Amp	4CB6	
V4	2nd Video-IF Amp	4CB6	
V5	3rd Video-IF Amp	4CB6	
V6	Video Output-Sound IF Amp	6AL5	
V7	Audio Det.	6BN6	
V8	Audio Output	6AQ8A	

ITEM No	USE	TYPE	NOTES
V9	AGC Noise Limiter-Sync Sep	4BU8	
V10	Vert. Mult.-Vert Output	9CM7	
V11	Horiz. Phase Det.-Horiz. AFC	8CN7	
V12	Horiz. Osc.-Horiz. Discb	9CG7	
V13	Horiz. Output	17DQ6	
V14	Damper	17AX4GT	
V15	HV Rectifier	1X2B	

PICTURE TUBE

ITEM No	REPLACEMENT DATA			NOTES
	ZENITH PART No.	GENERAL ELECTRIC PART No.	SYLVANIA PART No.	
V16	14XP4A	14X14-A [ ] 14XP4	14-Silver screen '85 *	

ELECTROLYTIC CAPACITORS

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA ZENITH PART No	AEROVOX PART No	CORNELL DUBILIER PART No	MALLORY PART No	PYRAMID PART No	SANGAMO PART No	SPRAGUE PART No	NOTES
C1	140	250	22-2745	AFH50-23	XA0261	FPU7	TMS-26	T-055	TVL-1428	
C2A	40	300	22-2742	AFH3-09-83		FP326 7	MT-771	MT-4580	R1200 *	
B	40	300					STD-150-500			
C	80	50								
C3A	4	200	22-2874	AFH4-114-55		FP376 6		T-820	R2301 *	
B	40	200				TC62		MMT-0220		
C	20	25								
D	10	500								

* Not stocked as a separate item.

FIXED CAPACITORS

Capacity values given in the rating column are in mfd. for Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP	RATING VOLT	REPLACEMENT DATA ZENITH PART No	AEROVOX PART No	CENTRALAB PART No	CORNELL DUBILIER PART No	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C4	13		22-2679							2.5%
C5	18	1000	22-2690							5%
C6	18	1000	22-2690							5%
C7	12		22-2679							2.5%
C8	8.2		22-2681	XPO-8I 8.2		C10VE2C				5%
C9	1.8		22-2428							
C10	1000		22-2752	EF-001	MPT-1000				503C-DI	
C11	1000		22-2877	EF-001	MPT-1000				503C-DI	
C12	25		22-2671	N750-25	TCZ-25	C10QS5U	TCT-25		57CU-Q25	N750
C13	1000		22-1721	EF-001	MPT-1000				503C-DI	
C14	1000		22-2732	EF-001	MPT-1000				503C-DI	
C15	1.0		22-2720	XPO-8I 1.0	TCZ-1		TCO-1		57CCB-V1	
C16	3.0		22-2754							N330
C17	3.0		22-2758							N330
C18	3.0		22-2758							N330
C19	800		22-2331	BPD-0008	DD-8GI					
C20	1000		22-2732	EF-001	MPT-1000				503C-DI	
C21	10		22-2731	XPO-8I 10		C10GIC	TCO-10	ZT-10	57CCB-Q1	NPO 5% NT5 10%
C22	47		22-2378							
C23	470	1000	22-6	BPD-00047	DD-47I	BYAI07-47	ED-470	UC-5347	SGA-T47	
C24	8		22-2481			C10V8C				N2P0
C25	470		22-16		DS-47I	L10Y47	ED-470			10%
C26	470		22-16		DS-47I	L10Y47	ED-470			10%
C27	10		22-2296							10%
C28	1000	1000	22-17							10%
C29	1000	1000	22-17							10%
C30	330		22-2866	1469-00033		SR5T33			MB-333	10%
C31	1000	1000	22-17							10%
C32	8.7		22-2867							N470
C33	47		22-2467							N90 5%
C34	4700		22-14		DS-47I	L10Y47	ED-470			10%
C35	2	200	22-1777	P288N-1	DF-004	CUB2P1		GEM-3DI	2TM-P1	
C36	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C37	100		22-9		DS-10I	L10YI	ED-100		GEM-3015	10%
C38	15	200	22-2852	P288N-15		CUB2P15		GEM-3015	2TM-P15	
C39	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C40	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C41	1	200	22-2780	P288N-1	DF-104	CUB2P1		GEM-3DI	2TM-P1	
C42	033	600	22-2225							10%
C43	047	200	22-2792	BPD-DS	DF-503	CUB2S47		GEM-3I47	2TM-S47	
C44	3.3		22-2343	XPO-8I 3.3	TCZ-3R3	CTAV13C	TCO-3.3	ZT-3R33	TCZ-V33	
C45	50		22-2480	SI 50	DS-500	LT5Q5	ED-50	UC-545	50A-Q5	
C46	4		22-2596			CTAV23C	TCO-3.3		57CCB-V33	5%
C47	470		22-2480	1469-00047		SR5T47			MB-347	10%
C48A	1000		22-21							10%
B	1000									10%
C49	10		22-2731							N150 5%
C50	470	1000	22-6	BPD-00047	DD-47I	BYAI07-47	ED-470	UC-5347	SGA-T47	
C51	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C52	2200		22-8	BPD-0032	DS-232	BYA10D32	ED-0022	UC-5232	SGA-D22	
C53	470	1000	22-6	BPD-00047	DD-47I	BYAI07-47	ED-470	UC-5347	SGA-T47	
C54	3300		22-11	BPD-0033	DS-332	BYA10D33	ED-0033	UC-5233	SGA-D33	
C55	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C56	033	400	22-2625							10%
C57	.1	600	22-2081	P488N-1	DF-104	CUB4P1		GEM-4DI	4TM-P1	
C58	0047	600	22-1849							10%
C59	06	200	22-2565							10%
C60A	35		22-25	SI 51	TCZ-5I	L10Q5I	ED-5I			
B	35			SI 51	TCZ-5I	L10Q5I	ED-5I			
C61A	1000		22-21							10%
B	1000									10%
C62	3300		22-18							10%
C63	05	200	22-1809	BPD-DI	DD-10I	CUB3DI	GP-10000	GEM-3II	3TM-SI	
C64	560		22-2565	1464-00068		SR5T68			MB-368	10%
C65	.1	200	22-2780	P288N-1	DF-104	CUB2P1		GEM-3DI	2TM-P1	
C66	1000		22-2163	1464-001		SR5DI			MB-321	10%
C67	1500		22-18							10%
C68	1000	1000	22-17							10%
C69A	1000		22-21							10%
B	1000									10%
C70	4700		22-16							10%
C71	180	4000	22-2683							N1500 10%
C72	.15	600	22-2261	P488N-15		CUB4P15		GEM-4015	4TM-P15	

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No	RATING CAP	RATING VOLT	REPLACEMENT DATA ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C73	10000		22-3	BPD-DI	DD-10I	BYA5SI	ED-DI	DC5U	58K-81	
C74	56	2000			DD30-560	HVA20G56	HD3-56	DC30456	7GA-Q56	
C75	470	1000	22-6	HVD-15-470	DD30-471	BYAI07-47	HD15-470	DC30347	10GAB-T47	
C76	470	1000	22-6	HVD-15-470	DD30-471	BYAI07-47	HD15-470	DC30347	10GAW-T47	
C77	047	500	22-1644	BPD-05	DF-503	CUB5S47		GEM-5I47	6TM-S47	
C78	10000	1400	22-2655							

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA ZENITH PART No	CENTRALAB PART No	CLAROSTAT PART No	IRC PART No	MALLORY PART No	INSTALLATION NOTES
R1A	1Meg	1	63-3264	B-69	A47-1Meg-S	QU-137	U54	Volume
B	Shaft			Not Req.	FS-3	Not Req.	Not Req.	
C	Switch			KB-1	SWE-12	76-1	US-25	
R2	500K	1	63-3284	B-51		QT-133	TA5SR	Brightness
R3	7000Ω	2	63-3909			WPKT500		Contrast
R4A	150K	1	63-3263	B-66	A47-750K-B	QU-138	U54	Vert. Hold
B	Shaft			Not Req.	KB-3	Not Req.	Not Req.	
R5A	350K	1	63-3635			BU-133	TA5AL	AGC
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R7A	3 Meg	1	63-3265	AB-89 *	A47-3.5Meg-S *	QU-148 *	PTA5S5L *	Vert. Size with 1Meg Stop
B	Shaft			AK-19	RN-3	TQ	Not Req.	
R8	750Ω	2	63-3284		S9-800		FL-750	Buzz - wire wound

* Connect a 1Meg resistor in series with the right hand terminal.

RESISTORS

All wattages 1/2 watt, or less, unless otherwise listed.

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R9	230K			BTS-230K	
R10	250K			BTS-250K	
R11	22K			BTS-22K	
R12	120K			BTS-120K	
R13	100K			BTS-100K	
R14	1200Ω			BTS-1200	
R15	100K			BTS-100K	
R16	100K			BTS-100K	
R17	4700Ω			BTS-4700	
R18	10K	2		BTS-10K	
R19	10K			BTS-10K	
R20	470K				
R21	120K			BTS-120K	
R22	1Meg				
R23	2.2Meg				
R24	180K			BTS-180K	Note 1
R25	680K				
R26	150K			BTS-150	Note 2
R27	3.3Meg				
R28	39K			BTS-39K	
R29	47K				
R30	1000Ω			BTS-1000	
R31	56Ω			BTS-56	
R32	120K			BTS-120K	
R33	10K			BTS-10K	
R34	1000Ω			BTS-1000	
R35	3300Ω			BTS-3300	
R36	5600Ω	2	63-3333	BTS-5600	
R37	120Ω			BTS-120	
R38	4700Ω			BTS-4700	
R39	47K			BTS-47K	
R40	4700Ω			BTS-4700	
R41	15K	2	63-342	BTS-15K	
R42	47Ω			BTS-47	
R43	1.2Meg			BTS-1.2Meg	
R44	39K			BTS-39K	
R45	68K			BTS-68K	
R46	1800			BTS-1800	
R47	470K			BTS-470K	
R48	100K			BTS-100K	
R49	100K			BTS-100K	

ITEM No	RATING OHMS	RATING WATT	REPLACEMENT DATA ZENITH PART No.	IRC PART No.	NOTES
R50	680Ω			BTS-680	
R51	390K			BTS-390K	
R52	33K			BTS-33K	
R53	22K	2	63-1566	BTS-22K	
R54	470Ω			BTS-470	
R55	680Ω	1	63-2290	BTA-680	
R56	2 Meg			BTS-2 Meg	
R57	3.3Meg			BTS-3.3Meg	
R58	220K			BTS-220K	
R59	100K			BTS-100K	
R60	270K			BTS-270K	
R61	22K			BTS-22K	
R62	330K			BTS-330K	
R63	100K			BTS-100K	
R64	220Ω			BTS-220	
R65	2.2Meg			BTS-2 Meg	
R66	82K			BTS-82K	
R67	22K			BTS-22K	
R68	1000Ω	1	63-965	BTA-1000	
R69	390Ω				
R70	390Ω				
R71	2200Ω			BTS-2200	
R72	470K			BTS-470K	
R73	470K			BTS-470K	
R74	10Meg				
R75	10Meg				
R76	47K				
R77	560Ω	1	63-1194	BTA-47K	
R78	10K			BTS-560	
R79	22K	2	63-1145	BTS-10K	
R80	68K			BTS-22K	
R81	180K			BTS-68K	
R82	22K	1	63-1313	BTS-22K	
R83	100Ω			BTS-100	
R84	470K			BTS-470K	
R85	100Ω			BTS-100	
R86	10K	4	63-3623	BW10-10K	
R87	10K	4	63-3623	BW10-10K	
R88	2.7	4	63-3631	BW1-2.7	
R89	17Ω	7	63-3680		
R90	56Ω	5	63-3644		
R91	230K			BTS-230K	

Note 1. Some versions may use a 150K in this application.
Note 2. Some versions may use a 180K in this application

TRANSFORMERS (SWEEP CIRCUITS)

ITEM No	USE	REPLACEMENT DATA ZENITH PART No	Halldorson PART No	Merit PART No	RCA TYPE No	Ram PART No	Stancor PART No	Thordarson PART No	Triad PART No
T1	Vert. Output	95-1535	Z1607 ①	A-2824 ①	V31S ①	VO-10 ①	26S75 ①	A-112X ①	
T2	Vert. Oscs. (3.58M)	96-1537 ①	DF606	MDF-56	2370I ①④	Y90T3/47 ①	DY-13A	Y-14 ①④	Y-40-3 ①
	90°- Vert. (3SMH)		①④	①④		①④	①④		
M6	Yoke Rear Cover & Centering Device	5-22237							
T3	Horiz. Output	5-40284 ⑦			#VO-128				

① Cut and tape blanking lead.
② Drill new mounting hole(s)
③ Connect as auto transformer. Use 15 to 1 turns ratio.
④ Includes resistors R59, R70 and capacitor C74.
⑤ Cut and form a piece of .010 gauge fish paper inside the yoke, support with an acetate cement, to provide an insulation between the width sleeve and the yoke. Use original yoke damping network, if necessary.
⑥ Use original rear cover and centering device.
⑦ Includes coil parts 46-40425 and 46-40427.

TRANSFORMER (AUDIO OUTPUT)

ITEM No	IMPEDANCE PRI.	IMPEDANCE SEC.	REPLACEMENT DATA ZENITH PART No	Halldorson PART No	Merit PART No	Stancor PART No	Thordarson PART No	Triad PART No	NOTES
T4	9700Ω	3-4Ω	95-1534	Z1117 ①	A-2823 ②	A-3878 ②	24S83	S-11X	① Drill one new mounting hole.

SPEAKER

ITEM No	TYPE SIZE	TYPE FIELD	TYPE V C IMP	REPLACEMENT DATA ZENITH PART No.	REPLACEMENT DATA QUAM PART No.	NOTES
SP1	4"	PM	3-4Ω	49-814	4A01	

COILS (RF-IF)

ITEM No	USE	ZENITH PART No.	NOTES
L1	IF Trap	20-581	
L2	IF Trap	20-587	
L3	Ant. Trans.	5-24844 ①	
L4	VHF Ant Coil	20-680 ②	Channel 2
L5	VHF Ant Coil	20-680 ②	Channel 3
L6	VHF Ant Coil	20-680 ②	Channel 4
L7	VHF Ant Coil	20-680 ②	Channel 5
L8	VHF Ant Coil	20-680 ②	Channel 6
L9	VHF Ant. Coil	20-680 ②	Channel 13
L10	Neut Coil	20-633	
L11	RF Coil	20-529 ③	Channel 2
L12	RF Coil	20-529 ③	Channel 3
L13	RF Coil	20-529 ③	Channel 4

ITEM No	USE	ZENITH PART No.	NOTES
L14	RF Coil	20-529 ③	Channel 5
L15	RF Coil	20-529 ③	Channel 6
L16	RF Coil	20-579 ③	Channel 6
L17	RF Coil	20-584 ③	Channel 13
L18	RF Coilo	20-581 ③	Channel 7 thru 13
L19	Mixer Screen	20-582 ④	
L20	Osc. Coil	20-583 ④	Channel 2
L21	Osc. Coil	20-583 ④	Channel 3
L22	Osc. Coil	20-584 ④	Channel 4
L23	Osc. Coil	20-585 ④	Channel 5
L24	Osc. Coil	20-586 ④	Channel 6
L25	Osc. Coil	20-587 ④	Channel 7
L26	Mixer Plate Coil	5-24377	

① Alternate part #6-24845.
② Wafer Assembly part #6-23640 includes L4 thru L9.
③ Wafer Assembly part #6-23640 includes L11 thru L18.
④ Wafer Assembly part #6-23639 includes L20 thru L26

COILS (RF-IF)

ITEM No.	USE	REPLACEMENT DATA ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L27	1st. Video IF	5-40289				Includes trap coil assy.
L28	RF Choke	30-879	19-1009		6803	1 Microhenry
L29	2nd. Video IF	5-40279				
L30	40.5MC Trap	5-24080				
L31	3rd. Video IF	5-40280				
L32	4th. Video IF	5-23960				
L33	Resonant Choke	5-23444				25 Microhenries
L34	Shunt Peaking Coil	5-18015	19-3300	TV-190	6123	325 Microhenries
L35A	4.5MC Trap	5-40818				
B	1st. Sound IF					
L36	Series Peaking Coil	5-30880	19-3128 *		6155 *	137 Microhenries, wound on 1K resistor
L37	2nd. Sound IF	5-40376				
L38	Quadrature Coil	5-19030			1490 ⚠	

* Parallel with 1K resistor
⚠ Drill new mounting hole.

TRANSFORMER (HORIZ. OSC.)

ITEM No.	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	RCA TYPE No.	Ram PART No.	Thordarson PART No.	NOTES
L39	185Ω		5-40275							Tapped @ 100Ω, 59-110 Millihenries

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE @ CURRENT 1000 ~(.)	REPLACEMENT DATA ZENITH PART No.	Halldorson PART No.	Merit PART No.	Stancor PART No.	Thordarson PART No.	Triad PART No.
L40	210A	65Ω	3.15 Hy.	96-1523 ①	C5030 ②	C-2974	C-3326 ②	26C43	C-31X

① Alternate part #95-1543.
② Drill one new mounting hole.

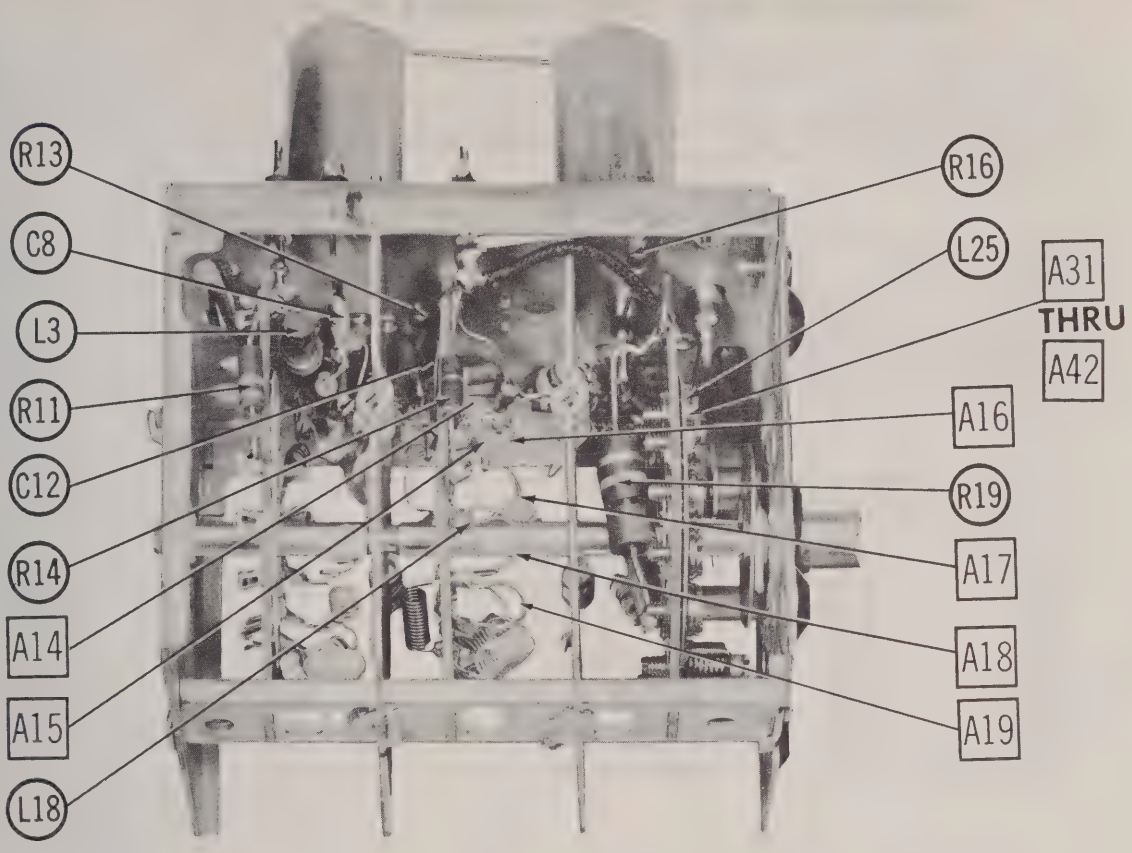
COMPONENT COMBINATIONS

ITEM No	USE	DESCRIPTION	ZENITH PART No	REPLACEMENT DATA
K1	Vert. Integrator		87-5	
K2	Pulse Shaping		87-4	

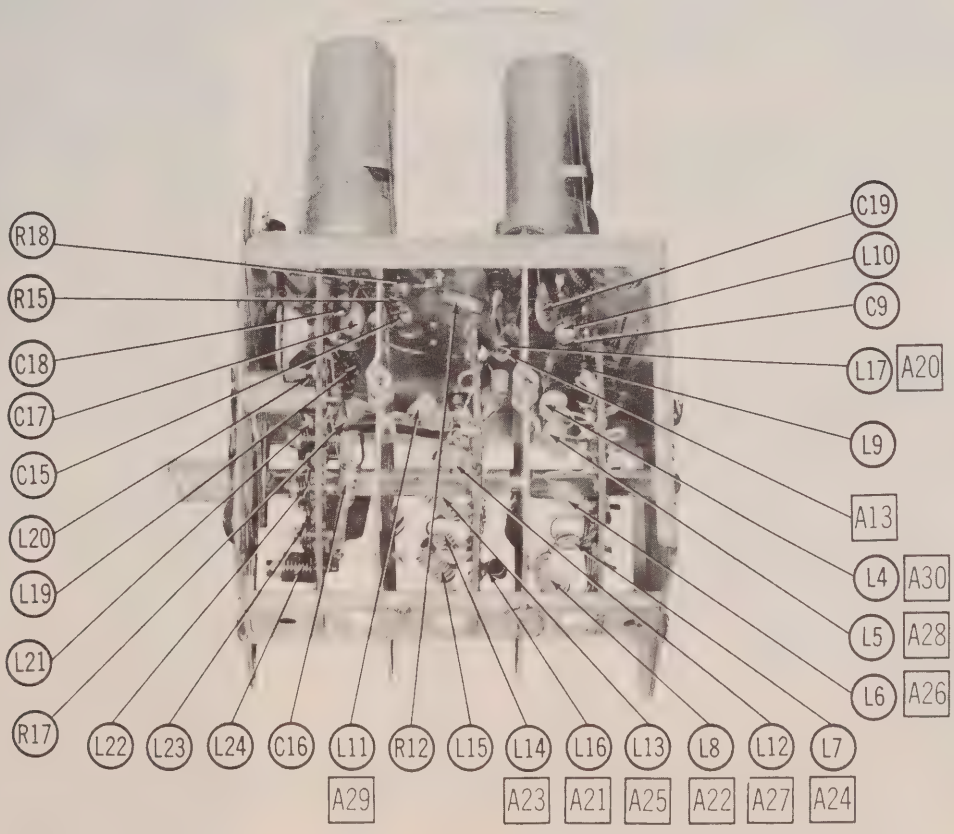
RECTIFIERS

ITEM No	RATING CURRENT (Measured)	REPLACEMENT DATA ZENITH PART No.	FEDERAL PART No.	GENERAL ELECTRIC PART No.	INTERNATIONAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.	NOTES
M1	.210A	212-14 ①②	1236A ②	1N1007 ③	MR500 ②	85300 ②	100 ②	
M2	.210A	212-14 ①②	1236A ②	1N1007 ③	MR500 ②	85300 ②	100 ②	

① Alternate part #212-19 ② Selenium Type. ③ Germanium Type.



RF TUNER-LEFT SIDE



RF TUNER-RIGHT SIDE

PARTS LIST AND DESCRIPTIONS (Continued)

CRYSTAL DIODES

ITEM No.	ORIG. TYPE	REPLACEMENT DATA			NOTES
		ZENITH PART No.	CBS PART No.	SYLVANIA PART No.	
M3	1N64	103-18	1N60	1N60	Video Det. (Pigtail)

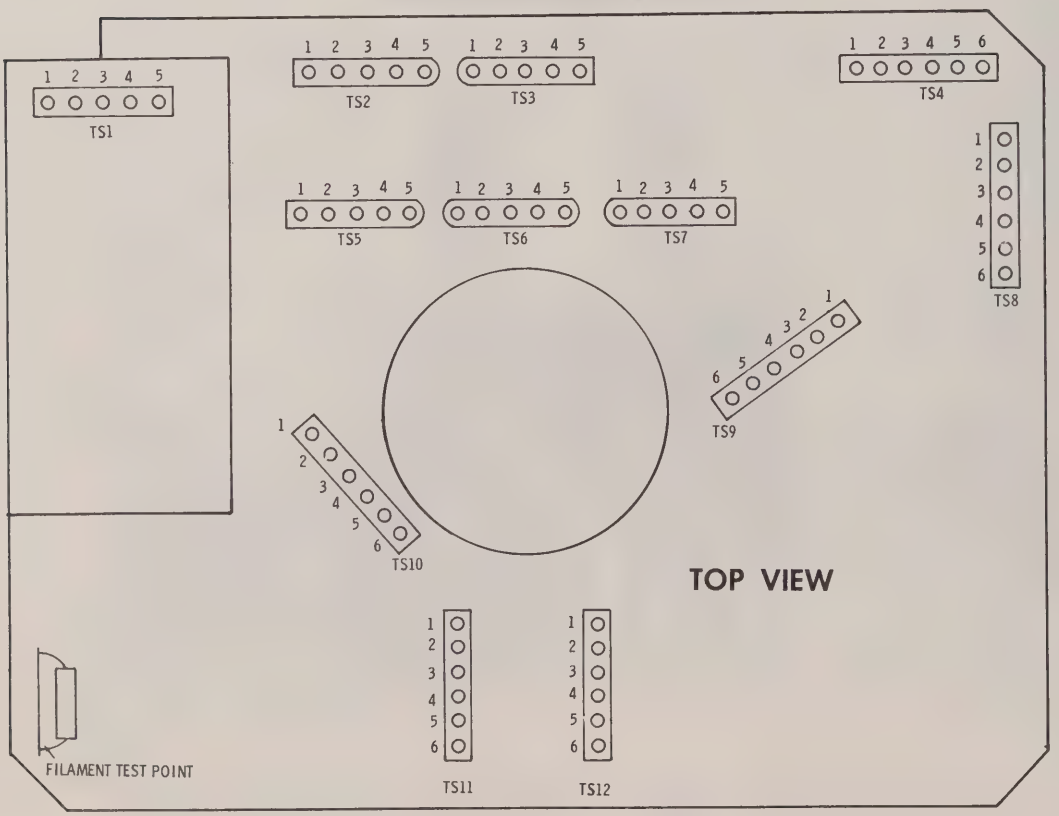
MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M4	Tuner	S-40282	VHF, Ch. 16Z25
	Tuner	S-40283	VHF, Ch. 16Z25U
	Tuner	S-40504	UHF, Ch. 16Z25U
M5	Width Sleeve	199-227	
M6	Centering Device	S-23237	Includes yoke rear cover
M7	Ion Trap	S-17164	

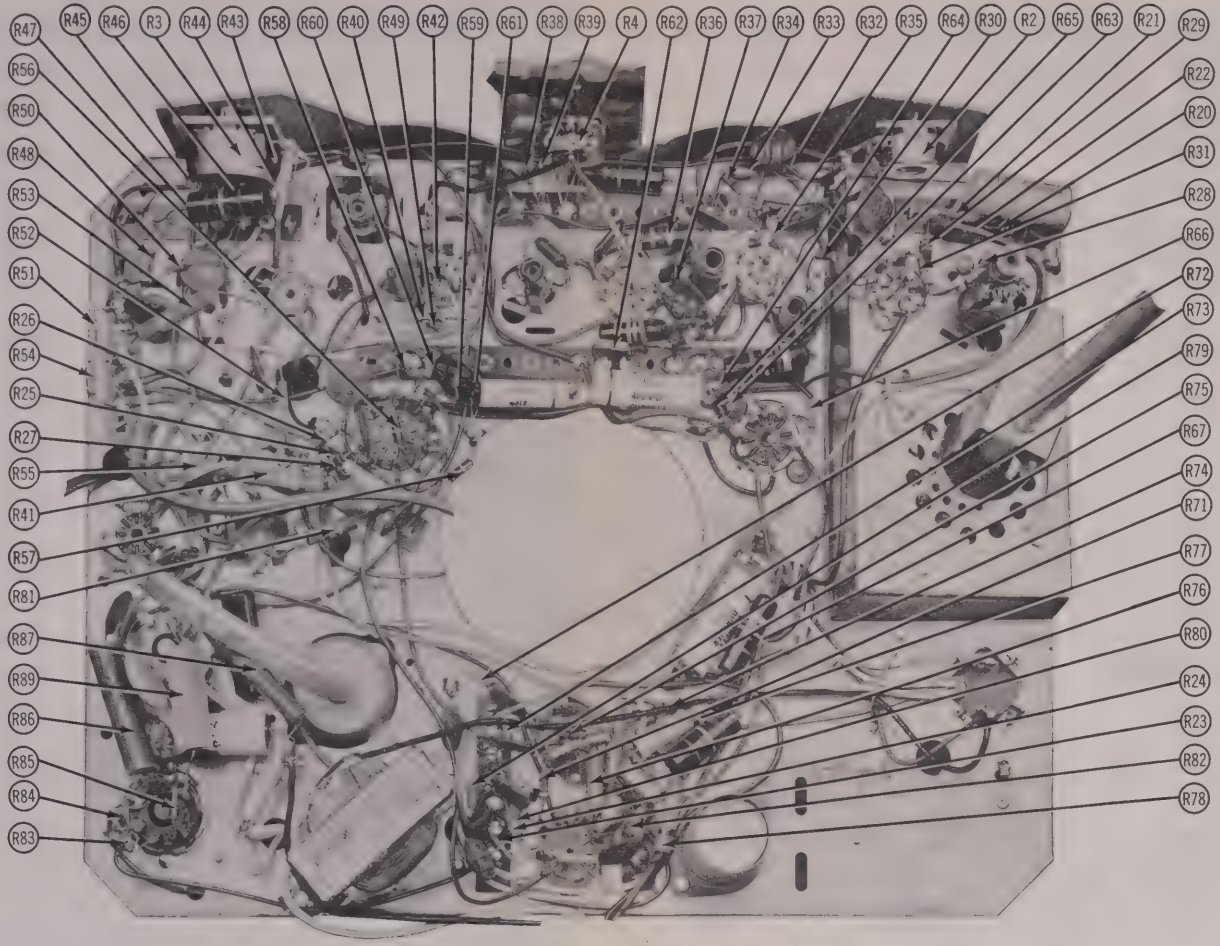
CABINETS & CABINET PARTS

(When Ordering Cabinets & Cabinet Parts, Specify Model, Chassis & Color)

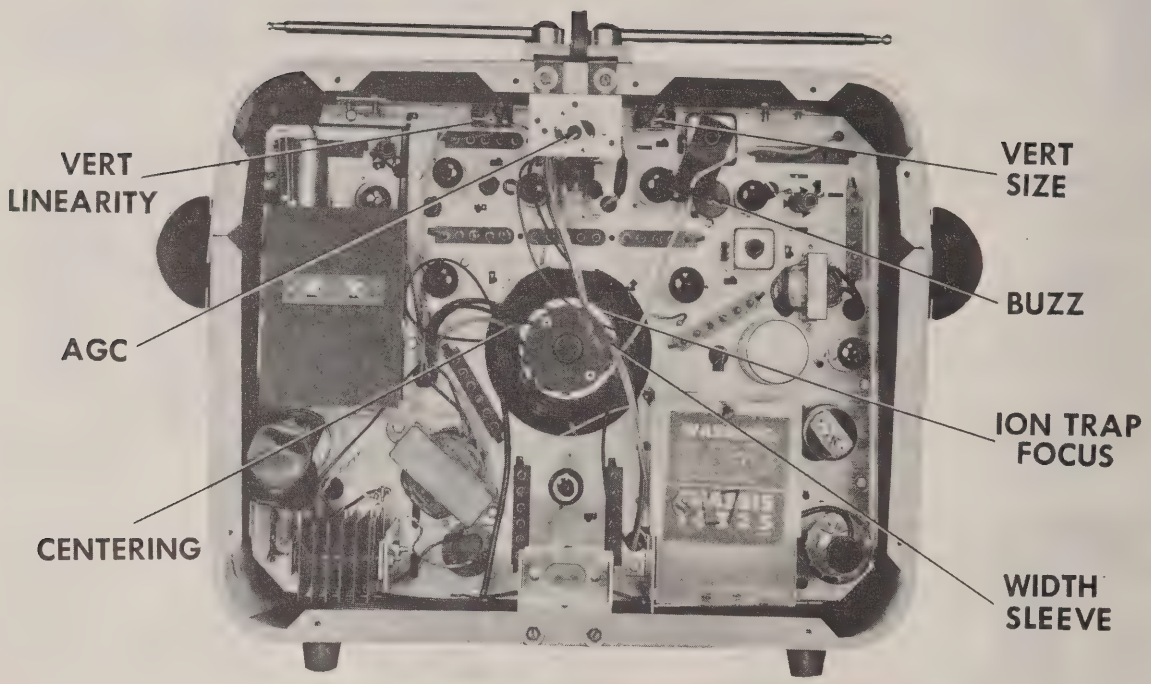
NAME	PART NO.	DESCRIPTION
Safety Glass	192-231	Models Z1512J, Z1511B
Safety Glass	192-230	Model Z1510L
Knob	46-1648	Channel Selector - Models Z1512J, Z1511B
Knob	46-1649	Channel Selector - Model Z1510L
Knob	46-1644	On-off-volume - Models Z1512J, Z1511B
Knob	46-1645	On-off-volume - Model Z1510L
Knob	S-40431	Fine Tuning
Knob	S-24915	Brightness, Contrast, Vert. Hold
Knob	S-40439	Horiz. Hold
Cabinet	14-2095	Model Z1512J
Cabinet	14-2096	Model Z1510L
Cabinet	14-2097	Model Z1511B
Handle	36-149	Model Z1512J
Handle	36-150	Models Z1511B, Z1510L



TERMINAL LOCATION CHART



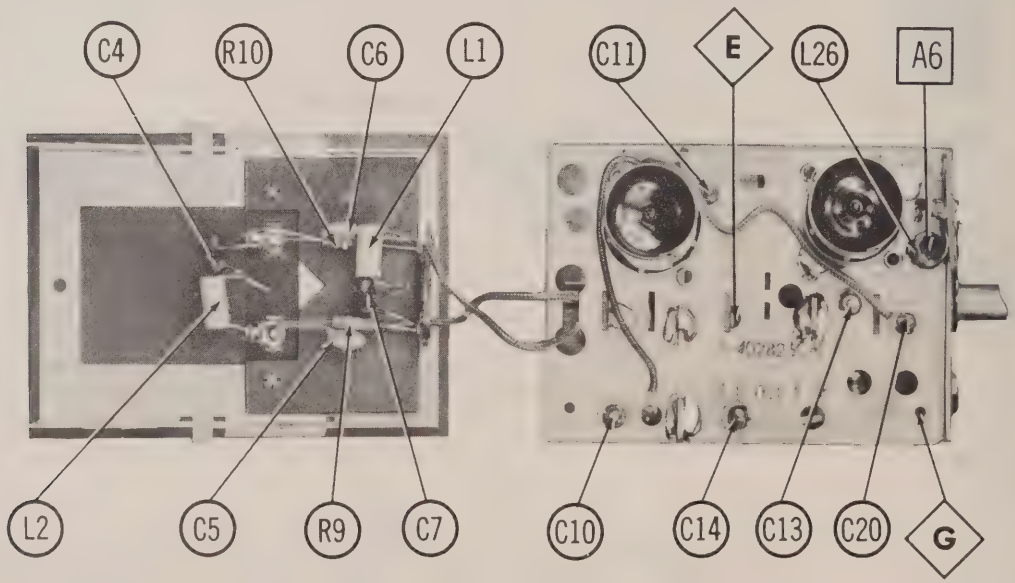
CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



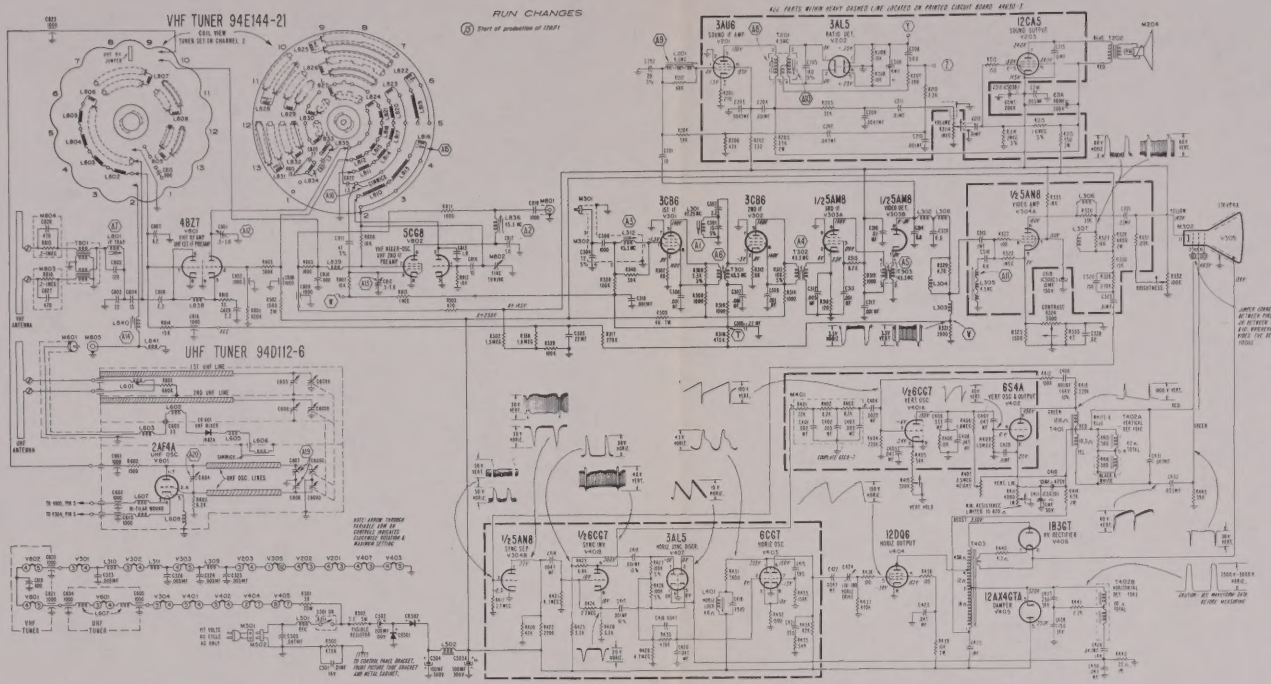
CABINET—REAR VIEW

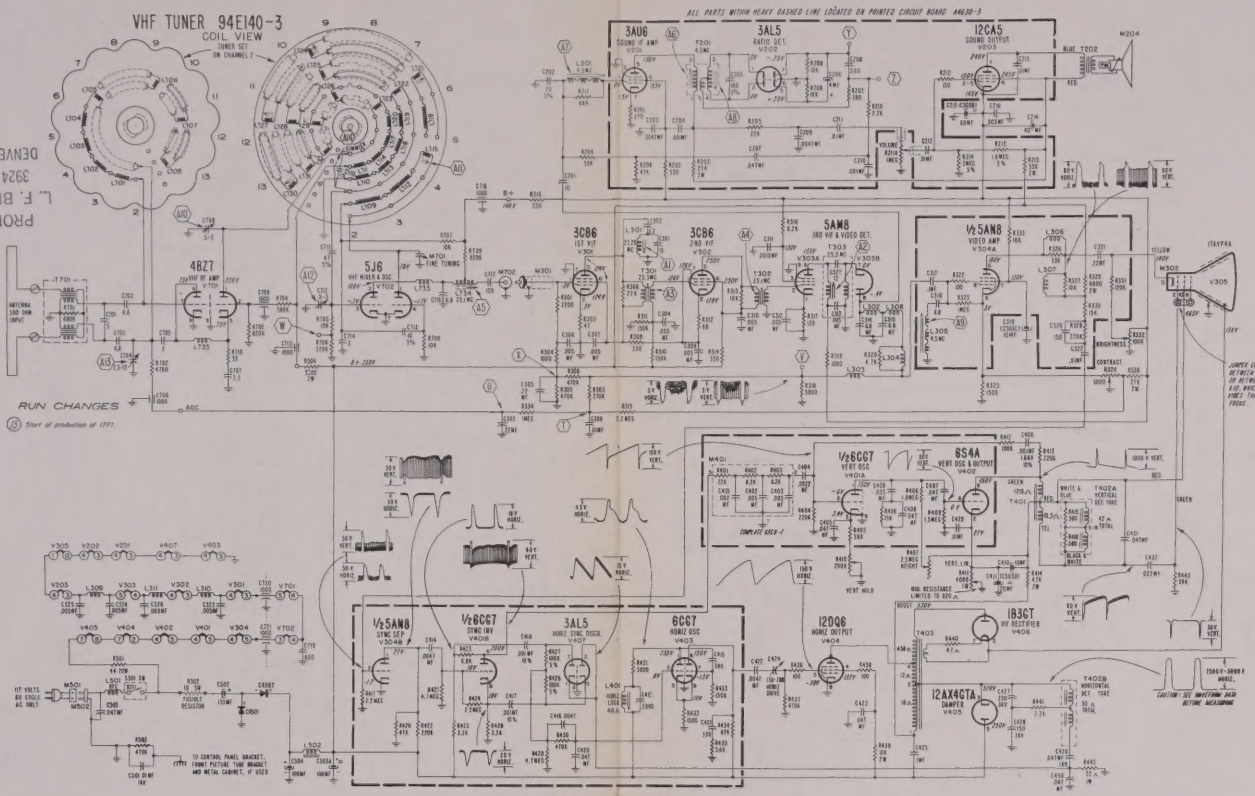
HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

1. Turn the set on and tune in a TV station, preferably with a test pattern.
2. Set the brightness and contrast controls for a normal picture.
3. Turn the horizontal hold clockwise until the picture loses sync. It may be necessary to switch off channel and back again for picture to lose sync.
4. Turn the horizontal hold slowly counter clockwise until the picture just falls into sync.



RF TUNER TOP VIEW


VHF TUNER 94E144-21
UHF TUNER 94D112-6
RUN CHANGES
3AU6
3AL5
12CA5
4BZ7
5CG8
3CB6
3CB6
1/2SAN8
1/2SAN8
1/2SAN8



ADMIRAL

MODELS	CHASSIS
T18A11	17F1
T18A12	17F1
T18A13	17F1

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